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Re: Eastern Divide Insect and Disease Project Phase II comments

Dear Mr. McKeague,

Thank you for the opportunity to comment on the December 2019 Draft Environmental Assessment (EA) for the proposed Eastern Divide Insect and Disease Project Phase II. We submit the below comments on behalf of The Clinch Coalition (TCC), the Virginia Wilderness Committee (VWC), the Sierra Club-Virginia Chapter, and the Southern Environmental Law Center (SELC).

We are glad the District has prepared a Draft EA and no longer seeks to use the Farm Bill Insect and Disease Infestation Categorical Exclusion, for which this project remains ineligible. Unfortunately, analysis in the Draft is lacking and cannot support a Finding of No Significant Impact (FONSI). In addition, aspects of the project would violate various laws and regulations, including the National Environmental Policy Act (NEPA), National Forest Management Act (NFMA), Clean Water Act (CWA), and the Jefferson National Forest Plan (Forest Plan).

We make many recommendations below to remedy these errors. Certainly, the District does not have to accept all of our recommendations. But we have sought, and will continue to seek, a path forward that reduces conflict and could lead to a project that has more broad public support, while allowing the District to implement its goals. We hope that the following comments are read in that light.

We know our comments are lengthy; this is because we want to be as clear as possible regarding the significant analysis we believe is missing from the Draft Environmental Assessment, and to provide as much information as possible to fill these gaps in analysis. We have provided a Table of Contents, which we hope helps with navigating our comments.

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1. Introduction

We were shocked to read Draft EA. During our July 2019 field trip into the Bromley Hollow working area, we discussed the possibility of the District completing a “focused EA.” As I said then, EAs can and should be done efficiently. Districts should identify the key, major issues of a proposal and focus on analyzing and addressing those issues in full. That is what I thought the “focus” in “focused EA” referred to.

It seems though, that the District meant something else entirely. The brevity of this EA is glaring and troubling: the District purports to analyze the environmental impacts of 1,200+ acres of regeneration logging in about 25 pages of analysis and 30 pages of supporting resource reports that are highly repetitive of the EA and themselves. We recognize, of course, that the length of an EA does not determine the adequacy of the analysis therein; it is the substance that matters. A robust and thorough EA of 75 pages could be adequate while a superficial, conclusory, and repetitive EA of 300 pages could be inadequate. Here, however, the shortness of the EA reflects the District’s shallow, conclusory, and deficient analysis of this project.

The District fails to analyze several risks of this project, while inadequately analyzing others. And to the extent the District has completed additional analysis that showed no significant impacts, it should have included it in the EA. As you know, NEPA requires the District to provide this information to the public so that we can then provide informed comments to the District.

The District should not be surprised by our criticisms of the Draft EA, having made a clear choice to depart drastically from the level of analysis that it (and other Districts across the GWJNF) has recognized as necessary for years. While projects differ in the level of analysis required on various issues, it is instructive to compare this Draft EA with others. For example, the Tub Run project, which this District approved in 2017, involved 1/3 of the regeneration harvest proposed here. Yet the District determined that EA analysis required 100+ pages of discussion that included three alternatives and analyzed a number of impacts excluded here. More recently, the North River District released its Final EA for the North Shenandoah Project just a few days after the District released the Draft EA for this project. Both projects propose approximately 1,200 acres of regeneration harvest. The North Shenandoah EA is 200+ pages, not including the geology, slope, climate, and soil reports that supplement EA analysis. Even the highly problematic Nettle Patch project, which was subject to numerous objections and eventually reduced its commercial harvest from 1,400+ acres analyzed in the Final EA to about 575 acres, required an EA of around 200 pages.

How does the District distinguish the analysis needs of those projects from this one? Why did the District determine that the impacts of this project and its alternatives could be adequately analyzed in around 25 pages? Does the District think it previously “overdid” it with Tub Run and other projects? Does the District believe that the North River District has needlessly spent years developing and analyzing the North Shenandoah project? What has changed from a regulatory standpoint? Or does the District think this project area, which includes nearly 30,000 acres of national forest is inherently simpler from an analysis perspective for some reason?

As discussed below, we do not think anything has changed to justify this startlingly brief EA. A “focused EA” is still an EA. It is subject to the regular NEPA requirements. This project must still comply with the substantive requirements of the National Forest Management

Act and the Clean Water Act. The District must resolve the deficiencies of the Draft EA in a revised EA or prepare an Environmental Impact Statement (EIS). Any revised, supplemental, or additional environmental analysis should be offered for public review and comment, before the district develops and releases a draft decision notice.

As detailed below, many issues require additional attention. First, the District was required to complete stand exams *before* writing silvicultural prescriptions to log those stands. The apparent failure to do so has been the most backwards – and perhaps telling – aspect of this project. To put it bluntly, it has seemed from the beginning that the District sought to bend the rules harshly in order to minimize planning and analysis, while maximizing the timber volume.

Why else would the District propose its most intense harvest in a management prescription dedicated to protecting the drinking water for Pulaski? Why else would the District reduce the residual basal area to below what the Forest Plan even analyzed? Why else would the District propose only regeneration logging, ignoring the science showing that this will cause some oak stands to convert to non-oak stands? Why else would the District not propose thinnings or prescribed fire to actually promote oak regeneration? Why else did the District seek to rely on an inapplicable categorical exclusion to avoid full NEPA review? Why else has the District prepared a “focused EA” that contains a small fraction of the analysis that this and other Districts typically provide?

To be clear, our organizations are not opposed to timber harvest. Over many years, decades even, we have each worked closely with the Forest Service and stakeholders to come together and find the balance between management and protection. But this Draft EA is *not* an example of moving through NEPA constructively and efficiently, which we also support. And to be sure, it is not how Forest Service projects are to be developed and analyzed.

That said, we are eager to help the District move forward and fix these errors so this project can move forward. We offer many suggestions below to develop a new alternative and fill the gaps in analysis. We look forward to discussing our comments with you and finding a constructive path forward.

2. Purpose and need

Neither analysis in the Draft EA nor other evidence shows that the proposed silvicultural prescriptions will satisfy the purpose and need of this project. The Draft EA provides several objectives for this project: (1) addressing forest health concerns resulting from past gypsy moth defoliation and current gypsy moth presence in the project area; (2) regenerating oak to maintain a significant oak presence in the project area; and (3) increasing early succession habitat (ESH) in the project area.¹ The Draft EA, however, does not contain analysis or evidence supporting that the proposed regeneration harvest will achieve these objectives in the proposed harvest units. To comply with NEPA and NFMA requirements, the District must grapple with this science and propose sound management that would actually achieve oak regeneration.

A. Stand examinations

A doctor cannot ethically prescribe medication until she has examined the patient,

¹ Draft EA 1.

diagnosed the problem, and determined a course of treatment that has been shown to address the problem. So too, the District cannot develop silvicultural prescriptions to “fix” specific problems until it has examined the areas to be treated, diagnosed the issue, and selected silvicultural prescriptions that science shows will address the problem.

Has the District conducted common stand exams (or other similar silvicultural examinations) for all stands proposed for treatment in the project area? As of June/July 2019, the District had only recently started conducting stand exams and had not completed them for all stands. Have those all been completed now? As you know, Forest Service directives require silvicultural exams to inform logging proposals. As the Forest Service Handbook explains:

Silvicultural examinations, diagnosis of treatment needs, and the preparation of prescriptions detailing the methods, techniques, and timing of the silvicultural activities necessary to achieve established objectives are required prior to initiating any silvicultural treatment on national forest lands. This includes all management actions affecting the establishment, growth, composition, health, and quality of forests and woodlands. On National Forest System lands, all silvicultural activities that cut, burn, establish, or otherwise modify forest vegetation, must have a silvicultural diagnosis and prescription prepared or reviewed by a certified silviculturist prior to implementing the project or treatment.²

This is because the silvicultural examination, which “collects and records site and stand characteristics needed to identify existing stand conditions, capabilities, and trends.”³ These metrics are needed for the diagnosis and silvicultural prescription.⁴ The stand diagnosis, which “considers and evaluates the site capability, management direction, and landscape context relative to desired stand conditions,”⁵ then “forms the basis for developing and proposing treatments or treatment alternatives in NEPA.”⁶ This information informs the silvicultural prescription, which “documents the results of an analysis of present and anticipated site conditions and management direction” and “describes the desired future vegetation conditions in measurable terms as developed during stand diagnosis.”⁷ In short, an understanding of on-the-ground conditions through a stand examination is the necessary building block for any proposed logging. For that reason, the Forest Plan acknowledges that NFMA and NEPA require

² FSM 2478.03.

³ FSH 2409.70 chapter 80.1.

⁴ Id.

⁵ FSH 2409.70 chapter 80.2.

⁶ Id.

⁷ FSH 2409.70 chapter 80.3; see also 16 U.S.C.A. § 1604(g)(3)(E)(iv) (Forest Service must “insure that timber will be harvested from National Forest System lands only where ... the harvesting system to be used is not selected primarily because it will give the greatest dollar return or the greatest unit output of timber”).

“any decisions on even-aged or uneven-aged timber harvest methods ... be based on site-specific analysis[.]”⁸

Unfortunately, it is not clear that the District has done so. Without adequate site-specific information to inform its proposal for 1,200 acres of regeneration harvest and adequate evidence that this will address diagnosed needs in the proposed units, the District does not satisfy its NEPA and NFMA obligations.

B. Gypsy moth science

It is very disappointing that the District is still stating that the proposed regeneration harvest will somehow address damage or threats from gypsy moths in the project area, despite ample evidence to the contrary. We will not repeat our lengthy scoping comments, supported by Dr. Muzika’s declaration; we incorporate them fully into these comments by reference and urge the District to re-read the comments and Dr. Muzika’s declaration.

The best science rejects the District’s claim that it can somehow manage for gypsy moth *and* oak regeneration using the same silvicultural methods.⁹ Oaks, in general, are highly preferred by gypsy moths.¹⁰ Throughout their range in North America, gypsy moths are most commonly defoliating red oaks and white oaks.¹¹ Reducing susceptibility thus tends to focus on reducing the prevalence of preferred host trees within a stand.¹² The most common silvicultural method for doing so is selectively thinning oak, particularly low vigor oak, and other preferred host species, *not* oak regeneration.¹³ Despite the fact that we included this important information in our scoping comments, the District continues to claim that its project objectives are “insect and disease” control and oak regeneration.

Moreover, the District continues to make unsupported statements such as “[t]rees are expected to be vigorous and mostly insect and disease free.”¹⁴ This statement simply has no basis in reality. As we explained in our scoping comments, recent studies suggest silvicultural treatments likely had no positive effect on oak vigor.¹⁵ In fact, research has shown that the proposed harvest would likely do more ecological harm than good.¹⁶

Why has the District not addressed these studies or provided their own studies to

⁸ Jefferson National Forest Plan FEIS 3-345. See also Dr. Muzika Scoping Declaration ¶ 14 (the best scientific information is clear that site-specific data are critical to decide if active forest management is appropriate” and for selecting the appropriate silvicultural treatments).

⁹ June 24, 2019 Scoping Comments with Declaration of Rose-Marie Muzika, Ph.D. at 7-17.

¹⁰ June 24, 2019 Scoping Comments with Declaration of Rose-Marie Muzika, Ph.D. at 8; Dr. Muzika Scoping Declaration ¶ 35.

¹¹ Id.

¹² Id.

¹³ Id.

¹⁴ Draft EA 14.

¹⁵ June 24, 2019 Scoping Comments with Declaration of Rose-Marie Muzika, Ph.D. at 12.

¹⁶ Dr. Muzika Scoping Declaration ¶¶ 73-76.

support the conclusions in the Draft EA? The District also states that for Coppice with Reserves treatment, it might also “salvage” dead, defoliated, and dying trees. But this oversimplifies the issues. As Dr. Muzika explained during the scoping phase, “defoliation” does not mean a tree is dying. Indeed, many factors affect whether a susceptible tree will die as a result of defoliation and trees can withstand multiple episodes of defoliation without dying.¹⁷

The District’s continued failure to grapple with evidence contradicting its claims and conclusions in the Draft EA violates NEPA.¹⁸ Accordingly, the District must either (1) explain why the proposed logging to address the gypsy moth objective is not inconsistent with the best available science, or (2) revise the name and objectives of this project to more accurately reflect nature of this vegetation project.

C. Oak regeneration science

The best science does not support the District’s claim that the regeneration harvests will result in oak regeneration. Oak regeneration is a major goal of this project. According to the Draft EA, the Shelterwood with Reserves treatments in 8A1: Mix of Successional Habitats in Forested Landscape were “designed to regenerate most of the areas to maintain a significant oak component in the future stands.”¹⁹ Similarly, the Draft EA states that Coppice with Reserves treatments in 9A1: Source Water Protection Watersheds would “help to ensure the continued presence of an oak component in the areas targeted for treatment.”²⁰ We understand these goals and support responsible, science-backed management to achieve oak regeneration.

Unfortunately, the Draft EA does not demonstrate that regeneration logging in these units will actually regenerate oak. Indeed, the best science does not support the proposed one-size-fits-all management approach for oak regeneration. If oak regeneration is to remain a major purpose of this project, the District needs to reconsider the issue based on best science and propose a suite of management actions that are in fact likely to achieve this objective. NEPA and the NFMA require this.²¹

The project area is composed primarily of upland oak stands, with some areas of mixed oak-pine stands.²² The higher quality sites support northern red oak, chestnut oak, black oak,

¹⁷ Dr. Muzika Scoping Declaration ¶ 46-47.

¹⁸ Genuine Parts Co. v. EPA, 890 F.3d 304, 312 (D.C. Cir. 2018) (agency “cannot ignore evidence contradicting its position”); Native Ecosystems Council v. Marten, 883 F.3d 783, 795 (9th Cir. 2018) (agency violates NEPA where it presents information “so incomplete or misleading that the decisionmaker and the public could not make an informed comparison of alternatives.”).

¹⁹ Draft EA 1.

²⁰ Id. at 2.

²¹ Ogeechee-Canoochee Riverkeeper, Inc. v. U.S. Army Corps of Eng’rs, 559 F. Supp. 2d 1336, 1345 (S.D. Ga. 2008) (finding Corps’ decision arbitrary and capricious where it failed to support with evidence its conclusion that regeneration would occur, despite contradictory evidence in the record about appropriate silvicultural treatment to ensure regeneration); Motor Vehicles Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29 (1983) (agency action is arbitrary and capricious where it “offer[s] an explanation for its decision that runs counter to the evidence before the agency.”); 16 U.S.C. § 1604.

²² Draft EA 9.

with a minor component of yellow poplar and red maple.²³ Drier sites are dominated by chestnut oak, white oak, black oak, and scarlet oak, with scattered hickory, red maple, black gum, and other hardwoods.²⁴ Some stands contain patches of white pine, pitch pine, shortleaf pine. Yellow pine is scattered throughout the area.²⁵

At times, the Draft EA acknowledges the difficulty of regenerating oak in these oak-dominated stands: “There is little or no advanced regeneration of oaks in the understories of these stands,” which “suggests a difficulty in regenerating these stands in oak.”²⁶ Striped maple, red maple, sourwood, and patches of mountain laurel dominate the understory in most areas, while white pine dominates in some.²⁷ Red maple, striped maple, and white pine “are likely to become more dominant than oaks in future stand composition since most oaks found on the [District] are classified as intermediate in shade tolerance and not able to compete with vegetation that has a high shade tolerance.”²⁸ The District thus asserts that stump sprouting from live oaks is necessary to avoid future dominance by non-oaks such as red maple or yellow poplar.²⁹

Despite these difficulties, the Draft EA expresses confidence that these oak-dominated stands will regenerate as oak forest: “Regenerating tree species composition is expected to be similar to the existing vegetation due to the viable seed sources and to the potential for coppice regeneration within the harvested stands.”³⁰ The District believes that “adequate [oak] regeneration is expected from stump sprouts of smaller to medium oak stumps and supplemented by advanced oak regeneration.”³¹

The best science on oak regeneration does not indicate that all stands proposed for regeneration harvest will regenerate as oak stands. Indeed, the Draft EA predicts that certain stands will “likely convert to non-oak forest after harvest.”³²

Perhaps the most critical flaw is the Draft EA’s failure to grapple with the impact of having “little to no” advanced oak regeneration in the project area. Studies underscore the importance of advance oak seedlings and regeneration in successfully regenerating oak. Indeed, as Dr. Muzika explained in her declaration, “without adequate large oak advance reproduction, oak regeneration failure is all but certain.”³³ How does the District rationalize its conclusion that these stands will regenerate in oak?³⁴ What evidence or studies did the District rely on to

²³Id.

²⁴ Id.

²⁵ Id.

²⁶ Id. at 1, 10.

²⁷ Id. at 10.

²⁸ Id. at 9.

²⁹ Id. at 1, 2.

³⁰ Id. at 14.

³¹ Id. at 10.

³² Draft EA Wildlife Habitat and Successional Forests Report 3, 10

³³ Dr. Muzika Draft EA Declaration ¶ 21.

³⁴ See Draft EA at 14 (“Regenerating tree species composition is expected to be similar to the existing vegetation due to the viable seed sources and to the potential for coppice regeneration

conclude that stump sprouts, without advanced oak regeneration, would be sufficient? Not only are the District's conclusions unsupported, studies contradict the District's conclusions about stump sprouting as adequate to regenerate oak.³⁵ The District seems to be planning on a miracle, which neither the NEPA nor the NFMA allow as a basis for a silvicultural prescription.

Moreover, NEPA and the NFMA require the District to acknowledge if its proposed regeneration harvest is instead likely to cause conversion to non-oak forest and analyze the impacts of doing so.³⁶ In addition, the District must grapple with whether oak regeneration is a viable objective of this project as it is proposed.

Even if there was adequate oak regeneration in the project area, other site-specific factors and subsequent management are important to promoting oak regeneration. The District also fails to grapple with these issues. First, the District's low residual basal areas may create too much light, ultimately promoting shade intolerant competitors.³⁷ According to Dey, "the key to building populations of large oak advance reproduction is to provide adequate light to oak *without aggravating problems from competing vegetation that will also respond to the increased light.*"³⁸ The District must analyze how its proposed residual basal areas (which as discussed below, are far below the residual basal areas analyzed in the Forest Plan) will impact oak competition from shade intolerant species and subsequent oak regeneration in the project area.³⁹

Second, site index plays an important role in oak regeneration. Coppice with Reserves may be an appropriate silvicultural procedure on a low quality site, but "heavy cutting on high quality sites may actually lead to a loss of oak from increased competition."⁴⁰ The District has acknowledged this issue and predicted that its proposed Coppice with Reserves treatment in Units 1, 2, and 4 in the Peak Creek working area will convert to non-oak forest.

Third, when considering its oak regeneration objective, the District should consider the

within the harvested stands").

³⁵ See Dr. Muzika Draft EA Declaration ¶ 17-18.

³⁶ See 16 U.S.C.A. § 1604(g)(3)(B) (Forest Service must "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives, and within the multiple-use objectives of a land management plan adopted pursuant to this section, provide, where appropriate, to the degree practicable, for steps to be taken to preserve the diversity of tree species similar to that existing in the region controlled by the plan") (emphasis added); 36 C.F.R. § 219.9(a)(iii) (Forest Service must have standards or guidelines maintain or restore "the diversity of native tree species similar to that existing in the plan area").

³⁷ See Dr. Muzika Draft EA Declaration ¶ 19 (noting that if the residual basal area "constitutes more than a 50% reduction of basal area, this would open the canopy substantially more than recommended.").

³⁸ D. C. Dey et al., An Ecologically Based Approach to Oak Silviculture: A Synthesis of 50 Years of Oak Ecosystem Research in North America, *Revista Colombia Forestal* 13(2): 201-222, 208 (2010) (emphasis added).

³⁹ Ogeechee-Canoochee Riverkeeper, Inc., 559 F. Supp. 2d at 1345; Motor Vehicles Mfrs. Ass'n, 463 U.S. at 43.

⁴⁰ See Dr. Muzika Draft EA Declaration ¶ 25.

role of canopy structure in promoting oak regeneration, specifically the value of an “open canopy” in creating conditions needed to establish and maintain oak reproduction and the competition of faster-growing and/or more shade-tolerant species like red maple and yellow poplar.⁴¹ The District should then consider the role that other management can play in achieving an open canopy to promote oak regeneration.⁴² For example, the District should consider whether intermediate treatments like thinning could better achieve the purpose and need of this project.⁴³ If the goal is to create canopy openness for regeneration to develop, a moderate to heavy thinning, which leaves an intact forest while creating opening in the canopy, can serve the same purpose as a Shelterwood treatment, while maintaining wildlife habitat and promoting intactness of the canopy and the forest.⁴⁴

The District should also consider the role that prescribed fire following a silvicultural treatment can play in promoting oak regeneration.⁴⁵ One recent paper found that where thinning and prescribed fire were used, regardless of the thinning treatment, “three prescribed burns increased white oak densities[,]” “thinned and burned stands had larger white oak seedling sprouts than those thinned with no burn[,]” and “[t]hinning with one fire resulted in the highest densities of large white oak reproduction.”⁴⁶ Another study recognized the benefit of prescribed fire both at the beginning of the regeneration process in order to determine if “there is enough oak reproduction to proceed with oak regeneration” and also at the “end of the regeneration process as a release tool.”⁴⁷

Yet, the District seems not to have considered the use of thinnings and/or prescribed fire to meet its oak regeneration objective. This is despite the fact that the District recently approving over 60,000 acres of prescribed fire across the District. It seems that the burn units overlap with only a handful of logging units for this project.⁴⁸ To what extent did the District consider the role of prescribed fire in promoting oak regeneration as part of this project? Did the District consider, for example, proposing thinning units at sites approved for prescribed fire over the next 10 years? At minimum, the District should prioritize the prescribed fire areas that do overlap with logging units for this project.

⁴¹ See, e.g., Lower Cowpasture Final EA at 9, 29-33 (proposing a variety of silvicultural treatments, including thinning, and prescribed fire to address the “greatest stresses and threats to the oak forest and woodlands system” which are “the lack of open conditions needed to establish and maintain oak reproduction and the competition of [other] species”).

⁴² These actions need not be in lieu of actions designed to achieve other objectives, such as ESH or wildlife objectives.

⁴³ Dr. Muzika Draft EA Declaration ¶ 20.

⁴⁴ *Id.* at ¶ 20.

⁴⁵ See *id.* at ¶ 27; see also, C. J. Schweitzer et al., White Oak (*quercus alba*) Response to Thinning and Prescribed Fire in Northcentral Alabama Mixed Pine-Hardwood Forests, *Forest Science*, 65(6), 758-766 (2019).

⁴⁶ C. J. Schweitzer et al., White Oak (*quercus alba*) Response to Thinning and Prescribed Fire in Northcentral Alabama Mixed Pine-Hardwood Forests, *Forest Science*, 65(6), 758-766 (2019).

⁴⁷ P.H Brose et al, A Meta-Analysis of the Fire-Oak Hypothesis: Does Prescribed Burning Promote Oak Reproduction in Eastern North America?, *Forest Science* 59(3), 330 (2013).

⁴⁸ SELC Cumulative Impacts Map (attached).

Finally, the District should consider outside impacts that may hinder oak regeneration, such as deer browse. One recent study found that excluding browsers, in addition to creating canopy gaps, “nearly doubled oak sapling importance values.”⁴⁹ Has the District considered the current deer densities in the project area and how this will affect the success of oak regeneration? Without this analysis, it would be difficult for the District to accurately predict whether oak regeneration will be successful in the project area.

In sum, the best scientific information shows that oak regeneration is difficult to achieve. An important factor in ensuring oak regeneration is the presence of advanced oak regeneration in the units to be treated. Studies also highlight the importance of open canopy conditions for oak regeneration. Additionally, they highlight the role that non-regeneration silvicultural methods like thinnings, followed by prescribed fire, can play to open the canopy while reducing competition. Outside influences, such as deer browse, must also be considered. Rather than grapple with any of this science though, the District has proposed only regeneration harvest in an area with little advanced oak regeneration and proposes no subsequent management, other than some herbicide use, to encourage oak regeneration in the project area. The District must consider the relevant science on oak regeneration and demonstrate its proposal is likely to achieve the oak regeneration objective.⁵⁰

3. Forest Plan inconsistencies.

Beyond the above issues, certain aspects of the District’s proposal violate the Forest Plan by proposing: (1) timber harvest in unsuitable management prescriptions; (2) residual basal areas that are inconsistent with management described in the Plan; (3) silviculture treatments that are inconsistent with Management Prescription 9A1; and (4) timber harvest in extended areas of riparian corridors. These violations of the plan are also violations of the NFMA, which requires all projects and activities in national forests to be consistent with the Forest Plan.⁵¹ The District bears the burden of demonstrating this compliance.⁵² The District’s Draft EA fails to do so.

A. Management Prescriptions 5C, 6C, and 7E2

The District’s proposed timber harvest in Management Prescriptions 5C, 6C, and 7E2 would violate the Forest Plan.

⁴⁹ M. Thomas-Van Gundy et al., Reversing Legacy Effects in the Understory of an Oak-Dominated Forest, Canadian Journal of Forest Research, 44(4): 350-364 (2014). See also J. Lorber, M. Thomas-Van Gundy, S. Croy., Characterizing Effects of Prescribed Fire on Forest Canopy Cover in the George Washington and Jefferson National Forests, Research Paper NRS-31. USDA, Forest Service, Northern Research Station (June 2018).

⁵⁰ Genuine Parts Co., 890 F.3d at 312; Motor Vehicles Mfrs. Ass’n, 463 U.S. at 43.

⁵¹ 16 U.S.C. § 1604 (i); see also Sierra Club v. Martin, 168 F.3d 1, 4-5 (11th Cir. 1999); Cherokee Forest Voices v. U.S. Forest Serv., 182 F. App’x 488 (6th Cir. 2006).

⁵² See Lands Council v. McNair, 537 F.3d 981, 994 (9th Cir. 2008) (Forest Service must support its conclusions that a project meets the requirements of the NFMA and relevant Forest Plan); Neighbors of Cuddy Mountain v. U.S. Forest Serv., 137 F.3d 1372, 1377 (9th Cir. 1998) (“Forest Service must demonstrate that a site-specific project would be consistent with the land resource management plan”).

i. 5C: Designated Utility Corridors

Within Management Prescription 5C: Designated Utility Corridors in Caseknife and Peak Creek, the District proposes Coppice with Reserves and Shelterwood with Reserves treatments.⁵³ The Forest Plan, however, makes clear that lands in Management Prescription 5C are “classified as unsuitable for timber production.”⁵⁴ Moreover, no other standards provide an alternate allowance for logging in these areas. The District must drop these areas from logging units.

Setting aside that timber harvest is not allowed in these areas, the Forest Plan also provides that the District should “[a]ggressively control non-native, invasive plant species within these corridors.”⁵⁵ The District has not shown that it can control NNIS in these areas. Are these areas sufficiently clear of NNIS that they can withstand ground disturbance that will likely serve as a vector for NNIS expansion within the area? Do the proposed units require pre-treatment? Nor has the District committed to aggressively treating NNIS in these areas following harvest, instead indicating only that it will “may be” use herbicide to control NNIS in two of the six timber harvest units in Management Prescription 5C.⁵⁶ This would be inadequate.

ii. 6C: Old-Growth Forest Communities Associated with Disturbance

Within Management Prescription 6C: Old-Growth Forest Communities Associated with Disturbance in Bromley Hollow, the District proposes Shelterwood with Reserves treatments.⁵⁷ These areas, however, are also “classified as unsuitable for timber production.”⁵⁸ Timber harvest would only be permitted where it is specifically designed to address vegetation and forest health purposes not at issue here.⁵⁹ As detailed in our June 2019 scoping comments, which we incorporate here, and above in Section 2.B: Gypsy Moth Science, the proposed silviculture would not reduce the susceptibility or vulnerability of oak-dominated forest to gypsy moths or otherwise suppress, eradicate, or slow the spread of gypsy moth in these areas.⁶⁰ Instead, the proposed timber harvest is likely to do more ecological harm than good.⁶¹ Moreover, timber harvest will exacerbate NNIS, not help control it. Because logging in this area is not consistent with the forest plan, the District must remove these areas from proposed timber harvest.

iii. 7E2: Dispersed Recreation Areas-Suitable

Within Management Prescription 7E2: Dispersed Recreation Areas-Suitable in Dismal, the District proposes Shelterwood with Reserves treatments. The emphasis in these areas is to

⁵³ Draft EA 5-6.

⁵⁴ Forest Plan 3-72.

⁵⁵ Id.

⁵⁶ Draft EA 5-6.

⁵⁷ Id. at 5.

⁵⁸ Forest Plan 3-83.

⁵⁹ Id. at 3-82 to 83.

⁶⁰ See June 24, 2019 Scoping Comments with Declaration of Rose-Marie Muzika, Ph.D.

⁶¹ Id.

improve the opportunities for dispersed recreation and enhance visitor experiences.⁶² The Forest Plan allows timber harvest in these areas only “where hunting recreation and watchable wildlife are emphasized.”⁶³ In the Dismal area, the White Cedar Horse Camp and 5+ equestrian trails in the area make horseback riding a recreation emphasis of this area. Proposed units 16, 17, 18 are centered within the Pearis Thompson, Standrock Branch and Hoof and Hill Equestrian Trails. Similarly, the Appalachian Trail – one of the nation’s most popular hiking trails – is less than .5 mile south of proposed unit 18. Because hunting and watchable wildlife are not emphasized in these areas, and because timber harvest would likely be incompatible with the emphasized recreational uses of horseback riding and hiking, the District must drop proposed timber harvest in Management Prescription 7E2.

Additionally, as discussed below in Section 4.B: Recreation and Scenic Resources, the District must consider impacts to recreation. It is unclear if and to what extent the District intends to use equestrian trails in the Dismal area to access logging units. Doing so would likely require extensive construction work to widen and improve these trails. Equestrians would likely be unable to use these trails during that time. In addition, opening up trails to increased light can result in the trails becoming overgrown with briars and subsequently unusable. If the District does not commit to restoring and maintaining these trails after proposed timber harvests, the project will have an adverse impact on equestrian recreation in the area.

B. Reduced residual basal area

The District’s proposed residual basal area is below Forest Plan’s minimum basal areas. The District proposes two methods for its regeneration harvest:

- Shelterwood with Reserves, with a residual basal area of 15 to 25 square feet per acre,
- Coppice with Reserves, with a residual basal area of 5 to 15 square feet per acre.⁶⁴

These residual basal areas, however, are far less than those contemplated and analyzed in the Forest Plan. Standards for Management Prescription 8A1: Mix of Successional Habitats in Forested Landscapes, provide the following primary methods of regeneration harvest:

- Two-aged silvicultural systems, including Shelterwood with Reserves, with a residual basal area of 20 to 40 square feet per acre,
- Coppice with Reserves, with a residual basal area of 15 to 25 square feet per acre.⁶⁵

The Forest Plan includes these same minimum basal areas for Shelterwood with Reserves and Coppice with Reserves in many management prescription areas.⁶⁶ Indeed, the Forest Plan does

⁶² Forest Plan at 3-102.

⁶³ Id. at 3-105.

⁶⁴ Draft EA 3-4.

⁶⁵ See e.g., Forest Plan 3-115.

⁶⁶ See, e.g., Forest Plan 3-38 (same minimum basal areas in 4J: Urban/Suburban Interface); 3-44 (same minimum basal areas in 4K1: North Creek Special Area); 3-95 (same minimum basal areas in 7C: OHV Routes and ATV Use Areas); 3-108 (same minimum basal areas in 7F: Blue

not analyze or contemplate the District's reduced basal areas for Shelterwood with Reserves or Coppice with Reserves treatments in any management prescriptions.⁶⁷

Why has the District proposed to log more intensely than the Forest Plan analyzed or allows? In order to comply with the mandates of NFMA and NEPA, the District must be consistent with the Forest Plan.⁶⁸

C. Management Prescription 9A1

The District's proposed management in Management Prescription 9A1 would violate the Forest Plan. The primary emphasis of Management Prescription 9A1: Source Water Protection Watersheds is to "provide clean drinking water by maintaining healthy watersheds containing healthy forests."⁶⁹ The Gatewood Reservoir provides drinking water to Pulaski, Virginia.⁷⁰ Shockingly, the District proposes its most intense harvest method – Coppice with Reserves down to a residual basal area of 5-15 square feet per acre – here.⁷¹ In what world does it make sense to apply a more intense harvest here than in even Management Prescription 8A1, which actually has a timber harvest focus? This makes no sense.

Importantly, it also runs contrary to direction in the Forest Plan, which explains that in these areas, "[l]ow intensity commercial timber harvest ... [is] appropriate to maintain the long-term goals and stewardship objectives of the source water protection watershed."⁷² The Plan goes on to note that "longer rotation ages and a low percentage of early successional forest in

Ridge Parkway Visual Corridor); 3-119 (same minimum basal areas in 8B: Early Successional Habitat Emphasis); 3-123 (8C: Black Bear Habitat Management); 3-177 (same minimum basal area for coppice with reserves in 10B: High Quality Forest Products).

⁶⁷ See, e.g., Forest Plan 2-8 (minimum basal area of 50 square feet per acre in channeled ephemeral zones); 2-16 (minimum basal area of 15 square feet per acre for shelterwood with reserves and coppice with reserves for Indiana Bat management); 3-41 (minimum basal area of 60 to 80 square feet per acre for cove hardwood forest in 4K1: North Creek Special Area);

⁶⁸ 16 U.S.C. § 1604 (i).

⁶⁹ Forest Plan 3-151; see also Forest Plan 3-152 (protecting drinking water is "higher priority" than vegetation management; id. ("Timber harvesting operations focus on what is retained in the stand, not on wood fiber production."); id. ("Timber harvest practices are modified to recognize the watershed values of these lands."))

⁷⁰ Forest Plan 3-151; see also Town of Pulaski Comprehensive Plan at 36 (Gatewood Reservoir serves as primary water supply for Pulaski), 73 ("Gatewood [Reservoir]... is somewhat unique in that its watershed drains the Jefferson National Forest and is not downstream of any developed areas. The filtering effect of the undeveloped forest land, saves the Town treatment costs by partially filtering the runoff before it goes into the reservoir."), available at https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&ved=2ahUKEwiDpuDQpe3nAhUBIXIEHQNNNAMEQFjACegQIBBAB&url=https%3A%2F%2Fwww.pulaskitown.org%2FUserFiles%2FServers%2FServer_13176128%2FFile%2FGovernment%2FDepartments%2FCommunity%2520Development%2FFinal%2520Comp%2520Plan%2520Document_reduced%2520PDF.pdf&usg=AOvVaw13_bCwvtblW72_vdm3iFse

⁷¹ Draft EA 5-6.

⁷² Forest Plan 3-152 (emphasis added).

these areas reflect a ‘low intensity’ approach to vegetation management and the *higher priority of protecting drinking water*.”⁷³ Where timber harvesting occurs in 9A1, “harvesting operations focus on what is retained in the stand, not on wood fiber production” and “harvest practices are modified to recognize the watershed values of these lands.”⁷⁴

To this end, the Plan provides a rotation age of 120-180 years for upland hardwoods and cove hardwoods.⁷⁵ The Draft EA, however, indicates these stands range in age from 83 to 138 years, with an average age of around 106 years.⁷⁶ Has the District done field inventory indicating that FSVeg data is incorrect and these stands at least meet the *minimum* rotation age for regeneration harvest in these areas?

Moreover, the District’s proposal would likely create more than 4% ESH allowed by the Forest Plan in these areas. The Draft EA indicates there are 135 acres of existing ESH in these areas. The District proposes logging an additional 268 acres in the Caseknife, Peak Creek, and Tunnel Hollow areas. This would result in 403 acres of ESH, which is about 3.7% of the 10,905 acres of 9A1 land within the project area.⁷⁷

The District also acknowledges, however, that it has approved 5,000+ acres of prescribed fire in the Tract Mountain area. The District estimates that 80 acres (about 1.6%) of these will create ESH. What is this estimate based on? It does not comport with GWJNF fire effects data, which shows that a single prescribed burn creates an average of 5% ESH.⁷⁸ Thus, the prescribed burn would create an additional 250 acres of ESH in the project area. Combined with existing ESH and timber harvest, this would result in 653 acres of ESH, constituting 6% of the 10,905 acres of 9A1 land within the project area.⁷⁹ This, of course, exceeds the *maximum* of 4% ESH allowed within 9A1 areas.⁸⁰ So even if timber harvest were appropriate in 9A1, the District would need to reduce the levels to stay within Plan limits.⁸¹

⁷³ *Id.* (emphasis added).

⁷⁴ Forest Plan 3-152.

⁷⁵ *Id.* at 3-154.

⁷⁶ *See* Draft EA 4-6.

⁷⁷ *Id.* at 8, 19.

⁷⁸ J. Lorber, M. Thomas-Van Gundy, S. Croy., Characterizing Effects of Prescribed Fire on Forest Canopy Cover in the George Washington and Jefferson National Forests 11, Research Paper NRS-31. USDA, Forest Service, Northern Research Station (June 2018).

⁷⁹ *See* Draft EA 8, 19.

⁸⁰ This is likely still a low estimate since it does not account for future ESH created from natural disturbance. The Draft EA recognizes that an indirect effect of the proposed timber harvest would be the potential to increase the chance of wind-throw in adjacent stands and reserve clumps. Draft EA 16.

⁸¹ The District must also consider existing and predicted ESH on nearby private land as part of its cumulative effects analysis and when developing alternatives with varying levels of ESH creation. Forest Plan at 2-11 (“Conditions of surrounding private lands are not included in objectives, but are considered during project-level planning. For example, high amounts of quality early successional forest on surrounding private land might result in a decision to provide such habitat on national forest land at the low end of the objective range.”)

How does the District reconcile Plan mandates to protect drinking water above all in these areas with its decision to apply its most intense harvest method, with an impermissibly low residual basal area of 5 to 15 square feet per acre? This is not “low intensity” timber harvest contemplated by the Plan. The District must drop these units or modify its proposal in them to comply with the Forest Plan, NEPA, and the NFMA.

D. Management Prescription 11

The Draft EA states that the District may harvest timber in extended areas of Management Prescription 11: Riparian Corridors “to meet the purpose and need of the project.”⁸² The Forest Plan, however, only allows timber harvest in the extended area of riparian corridors when the adjacent management prescription is suitable for timber harvest.⁸³ As discussed above, timber harvest is not suitable in Management Prescriptions 5C, 6C, and 7E2. Accordingly, the District cannot proceed with any timber harvest where the adjacent management prescription is 5C, 6C, or 7E2.⁸⁴

Nor can the District log in the extended area of riparian corridors in the Dismal area. In short, the District cannot simultaneously rely on riparian corridors to protect candy darter and other species, while also proposing logging in the riparian corridors.⁸⁵

4. Missing analysis

The Draft EA fails entirely to consider important impacts of this project. An EA must address “the environmental impacts of the proposed action and alternatives.”⁸⁶ NEPA requires this information be available to the public “*before* decisions are made and *before* actions are taken.”⁸⁷ The District entirely omitted consideration of roads, recreation and scenic resources, climate change, locally rare species, and heritage and cultural resources in the Project area.⁸⁸ These significant omissions in the environmental analysis preclude the public from evaluating the severity of the adverse effects of Phase II of the Eastern Divide Project, because they have not been analyzed and disclosed. Without a full consideration of project impacts, the District’s EA cannot support a finding of no significant impacts.⁸⁹ Additionally, where the District has entirely failed to consider impacts on resources in the project area, it cannot ensure the project is consistent with the Forest Plan, as required by NFMA.⁹⁰ Accordingly, the District must issue a revised Draft EA that includes consideration of impacts described below.

⁸² Draft EA 8.

⁸³ Forest Plan 3-183 to 3-184.

⁸⁴ 16 U.S.C. § 1604 (i).

⁸⁵ Compare Draft EA Aquatic Organisms Report 6 (impacts will be minimal because “[n]o timber harvest or ground disturbing activities would occur in protected riparian corridors”) with Draft EA 8 (ESH “creation may occur in the extended area in the Rx 11 Riparian Corridors.”)

⁸⁶ 40 C.F.R. § 1508.9(b).

⁸⁷ Id. at § 1500.1(b) (emphases added).

⁸⁸ Draft EA 8.

⁸⁹ Del. Riverkeeper Network v. FERC, 753 F.3d 1304, 1313 (D.C. Cir. 2014) (“[C]onclusory statements of ‘no impact’ are not enough to fulfill an agency’s duty under NEPA.”).

⁹⁰ 16 U.S.C. § 1604 (i).

A. Travel/Roads

On what basis did the District conclude that the Roads/Transportation system was “not present,” was “not directly or indirectly impacted by the alternatives” or was “out of the scope appropriate for [the] project”?⁹¹ This is incorrect and the District cannot avoid this analysis, particularly when acknowledging that it is not planning other projects that provide opportunities to do so in this area for the next ten years. Without any analysis of roads, and specifically consideration of the George Washington and Jefferson National Forest’s Travel Analysis Report (TAP) recommendations for project area roads, the District has violated its duties under NEPA.⁹² Additionally, the District must analyze road conditions to ensure compliance with the Clean Water Act.

i. **The TAP**

After release of the 2004 Forest Plan, Forest Service transportation regulations required that each national forest identify the “minimum road system.”⁹³ This is defined as the system “determined to be needed” for several purposes, including “to meet resource and other management objectives adopted in the [forest plan] ..., to meet applicable statutory and regulatory requirements, to reflect long-term funding expectations, [and] to ensure that the identified system minimizes adverse environmental impacts associated with road construction, reconstruction, decommissioning, and maintenance.”⁹⁴

To determine the minimum road system for a particular national forest, a science-based roads analysis was conducted.⁹⁵ The GWJNF completed its Transportation Systems Analysis (TAP) report on September 24, 2015. It confirmed that: (1) funding has been inadequate to properly maintain roads and bridges; (2) as of 2015, the GWJNF road system was funded at only 43% of funding needed to fully maintain its roads; (3) some roads are causing water quality problems and stress to aquatic organisms, especially where they are not regularly and properly maintained.⁹⁶ The resulting travel analysis made recommendations to inform travel management decisions at the project level. The Plan indicates that the Forest cannot maintain its current road system. Indeed, the Forest Plan has a goal of decommissioning 30 miles of road per decade.⁹⁷ Because the Draft EA is a decision document (unlike the TAP or Forest Plan), the burden to deal with the roads system hits home now; the District’s failure to discuss roads is unacceptable.

At minimum, the District must consider how this project fits into this larger roads analysis, whether or not to implement specific TAP recommendations, and whether there are any roads in the project area that the TAP recommends for downgrading or decommissioning.

⁹¹ Draft EA 8.

⁹² See *Motor Vehicles Mfrs. Ass’n*, 463 U.S. at 57 (“agency must examine the relevant data and articulate a satisfactory explanation for its action including an internal rational connection between the facts found and choice made.”)

⁹³ 36 C.F.R. § 212.5(b)(1).

⁹⁴ *Id.*

⁹⁵ *Id.*

⁹⁶ TAP, App. C.

⁹⁷ Forest Plan 2-57.

This consideration must be included in the EA to ensure the District is accurately classifying roads and characterizing necessary maintenance work as required by the Forest Service regulations. The District must also account for the impacts of this work in the EA for the project. It is important for the public to see which roads will be improved and which need reconstruction because the road work, when properly accounted for, may be impermissible.

For example, the District proposes to use FR 201 to access logging units in the Dismal area. The TAP identified this road as having “[l]ots of resource needs/issues” and notes that this road is in a rare community, parallels a trout stream, and should be paved in the Mechanicsburg quadrant to reduce annual maintenance needs.⁹⁸ The TAP recommended upgrading the objective maintenance level.⁹⁹ Have these upgrades happened? The District must consider the impacts of using this road on rare communities and on water quality in the trout streams. Additionally, does the District propose to use the portion of this road in the Mechanicsburg quadrant? If so, has this road been paved yet per the TAP recommendation? If not, does the District intend to do so as part of the proposed project? And have the resource needs and issues noted in the TAP been addressed? If not, what is the District’s plan to address these issues? If it does not intend to do so with implementation of this project, the only project planned in the area for the next ten year, when will it?

In the Gatewood area, the TAP notes several issues related to FR 6871: “[Road] might connect to a non-system road and then to pvt land? It’s a likely source for ATVs. Need to field review and check gate condition. Convert to berm. Clean up mattress dump.” Has this work been done? How will this project impact the existing issue of unauthorized roads and ATV usage? The District should be careful not to use known, unauthorized areas popular for illegal ATV use.¹⁰⁰ Opening these areas up more would only serve to encourage greater ATV use, exacerbating the problem.

Similarly, the District proposes to use FR 6031 to access Bromley Hollow units. The TAP notes on this road state: “[u]sed to be open seasonally” but “[h]asn’t been open last few years due to condition. Need to rework and reopen for Fall.”¹⁰¹ Has the necessary maintenance work been done to reopen this road? If not, what activities does the District propose in order to place it into use and what type of impacts would this result in? For FR 112 in the Dismal area, the TAP notes that an EA was done to relocate this road.¹⁰² Has the road in fact been relocated? If not, the District should not invest in maintenance of a road that will be relocated.

Additionally, the TAP recommends several roads in the project area for downgrading or decommissioning in the TAP¹⁰³:

- FR 6871 in the Gatewood area: Downgrade Objective Maintenance Level.
- FR 6851 in the Tunnel Hollow area: Downgrade Objective Maintenance Level

⁹⁸ TAP, App. C.

⁹⁹ Id.

¹⁰⁰ Draft EA 3,18

¹⁰¹ TAP, App. C.

¹⁰² Id.

¹⁰³ Id.

- FR 707 in Peak Creek area: Downgrade Objective Maintenance Level. Also indicates the need to close the road seasonally after it leaves private land on either end. Has this occurred?
- FR 1015 in Dismal Creek area: Decommission; “Convert to trail and admin use only behind pvt land boundary. Area accessed is in AT corridor or rare community area.”
- FR 112 in Dismal Creek area: Downgrade Objective Maintenance Level
- FR 10281 in Dismal Creek area: Downgrade Objective Maintenance Level

Without additional analysis, the District should not invest any resources in improving or maintaining roads that the TAP has recommended downgrading or decommissioning.

These are just some examples of TAP recommendations for roads in the project area that should be considered. In light of all these road issues, it is difficult to understand how the District concluded roads were irrelevant to its analysis for this project when there are numerous notes and maintenance recommendations to be considered in the TAP. Without any analysis and consideration of the TAP recommendations for roads in the project area, the District’s Draft EA violates NEPA and cannot provide the basis for a finding of no significant impact.¹⁰⁴

ii. The Clean Water Act

The Clean Water Act § 404 requires a permit from the U.S. Army Corps of Engineers for the discharge of dredged or fill material into water of the United States, such as caused by road crossings of streams, unless the discharge is for the purpose of an exempt activity, such as construction or maintenance of forest roads.¹⁰⁵ Forest roads are exempt only “where such roads are constructed *and maintained*[] in accordance with [BMPs].”¹⁰⁶ In failing to analyze roads at the project planning level, the District has failed to ensure the system roads in the project area are being maintained in accordance with the requirements of the Clean Water Act and state water quality standards.

As noted earlier, lack of funding to properly maintain roads has been a long-time problem across the agency. Where the road system is financially unsustainable, it is, as a result, also environmentally unsustainable: if the Forest cannot maintain road BMPs at the forest-wide level, the systematic maintenance deficits will likely impact roads in this project area. The access decisions made in connection with this project therefore cannot assume that roads will be maintained adequately to meet the requirements of law described above.

Under Corps regulations, forest roads must comply with “BMPs described in the state’s approved program description pursuant to the requirements of 40 CFR 233.22(i),” and shall also include “baseline provisions” set forth in the regulations.¹⁰⁷ These “baseline provisions” include, among others, (1) “not disrupt[ing] the migration or other movement of those species of aquatic life inhabiting the water body” and (2) ensuring “discharge[s] shall not ... adversely

¹⁰⁴ Del. Riverkeeper Network v. FERC, 753 F.3d 1304, 1313 (agency action is arbitrary and capricious where it “entirely fail[s] to consider an important aspect of the problem”)

¹⁰⁵ 33 U.S.C. § 1344(f)(1)(E).

¹⁰⁶ Id.

¹⁰⁷ 33 C.F.R. § 323.4(a)(6).

modify or destroy the critical habitat of [a threatened or endangered species.]”¹⁰⁸

However, there is good reason to question whether various roads in the Eastern Divide project area are being maintained in compliance with these BMPs. A 2007 survey of twelve stream crossings in the Eastern Divide project area, including a number of streams in the Dismal Creek area, revealed particularly concerning results: (1) 66% of the crossings were impassable for strong swimmers and leapers, (2) 92% were impassable for moderate swimmers and leapers, and (3) 100% were impassable for weak swimmers and leapers.¹⁰⁹ Have these crossings been fixed and brought into compliance with the requirements of the Clean Water Act? If not, the District must bring them into compliance when implementing this project.

And as discussed in more detail in Section 6: Dismal Creek Issues, the project area includes critical habitat for the endangered candy darter. The District must ensure that roads and stream crossings in this part of the project would not adversely affect critical habitat. Moreover, any additional road maintenance and construction, including temporary roads,¹¹⁰ project must comply with the conditions discussed above. The District Draft EA fails to discuss whether any of the 13 miles of temporary roads included as part of the proposed project will include stream crossing and, if so, how they will satisfy the requirements of Section 404 in order to be exempt from the permit requirement.

In sum, the District must ensure existing roads are in compliance with statutory and regulatory conditions, including applicable BMPs, and bring them into compliance if they are not already. Without doing so, the District cannot rely on the forest road exemption and must acquire the necessary permits from the Corps. The District also must ensure that construction of temporary roads in the project area similarly conforms to the requirements of the Clean Water Act and Corps regulations discussed above.

iii. Using trails as roads

Based on the Draft EA map for the Dismal area, it appears the District is proposing to use the Little Horse Equestrian Trail as a road in the Dismal area. But we understand this trail is a narrow, single track equestrian trail that would need significant work in order to expand it to allow for logging equipment and vehicles. Additionally, we understand from trail users that there are streams running along and across this trail, which run year round. The District cannot build a road through a stream. If it intends to use this trail as a road in the project area, it would have to construct the road in a way that does not impact the streams along the trail. In addition to considering recreation impacts as discussed below in Section 6: Dismal Creek Issues, the District must consider this (and any other use of trails to access logging units) from a roads

¹⁰⁸ *Id.* at § 323.4(a)(6)(vii), (ix).

¹⁰⁹ See attached USDA-FS, Southern Research Station, Center for Aquatic Technology Transfer (CATT), Fish Passage Status of Road-Stream Crossings on Selected National Forests in the Southern Region, 2007, at 116-17, 123, available at https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=2ahUKEwiF3eK8x-3nAhVkg3IEHcdtBulQFjABegQIARAB&url=http%3A%2F%2Fwww.srs.fs.usda.gov%2Fcatt%2Fpdf%2Faop%2F2007_aop_catt_report.pdf&usg=AOvVaw085Z8N66wmw15Cu52WEQWJ

¹¹⁰ 33 U.S.C. § 1344(f)(1)(E).

perspective.

B. Recreation and Scenic Resource

The District also failed to consider impacts to dispersed recreation and trails, as well as scenic resources, despite proposing management in popular recreation areas. Again, on what basis did the District conclude that Recreation and Scenic Resources are “not present,” are “not directly or indirectly impacted by the alternatives” or are “out of the scope appropriate for [the] project”?¹¹¹ Without this analysis, the District cannot support its finding of no significant impact.

The most significant issues with the District’s failure to consider impacts to scenic and recreation resources are discussed in more detail in Section 6: Dismal Creek Issues. The Dismal working area contains recreational and scenic resources that the District must evaluate and protect. For example, there are numerous horse trails in the Dismal working area, as well as sections of the Appalachian Trail. The District’s summary dismissal of potential impacts to recreation and scenic resources violates NEPA and NFMA.¹¹²

C. Heritage and Cultural Resources

Again, on what basis did the District conclude that Heritage and Cultural Resources are “not present,” are “not directly or indirectly impacted by the alternatives” or are “out of the scope appropriate for [the] project”?¹¹³ The District must provide more than a blanket statement that heritage and cultural resources will not be impacted; it must provide supporting evidence to adequately inform the public and its analysis. Did the District conduct archeological surveys to determine whether there were heritage and cultural resources in the project area? If so, the Draft EA should disclose those survey results. And if the District completed surveys, did it coordinate with the State Historic Presentation Office to determine whether it concurred with the District's findings of no impacts?¹¹⁴ This basic information is important for informing the public and supporting the District's finding of no significant impact. A “focused” EA does not mean the District simply gets to tell the public “trust us” and provide no supporting evidence for its conclusions that certain resources will not be impacted.

To the extent the District excluded any discussion of heritage and cultural resources because the project area does not include any Management Prescription 4E, that would be a far too narrow focus for the analysis. First, one factor in considering “significance” under NEPA is the “[u]nique characteristics of the geographic area such as proximity to historic or cultural resources[.]”¹¹⁵ Thus, concerns regarding impacts to heritage and cultural resources extend beyond specifically identified management prescriptions. Second, only four areas on the Jefferson National Forest are designated as Cultural/Heritage Areas under Management

¹¹¹ Draft EA 8.

¹¹² 40 C.F.R. § 1508.9(b); Del. Riverkeeper Network v. FERC, 753 F.3d at 1313; 16 U.S.C. 1604(g)(F)(v) (ensure timber harvest is “carried out in a manner consistent with the protection of ... recreation[] and esthetic resources[.]”).

¹¹³ Draft EA 8.

¹¹⁴ See e.g., Forest Plan 2-50 (FW-203).

¹¹⁵ 40 C.F.R. § 1508.27.

Prescription 4E.¹¹⁶ Yet, the Forest Plan recognizes the *multitude* of heritage resources on the Jefferson National Forest. Accordingly, the mere fact that the project area does not include Management Prescription 4E does not absolve the District of its responsibility under the Forest Plan to consider impacts to heritage and cultural resources and support its finding of no significant impact.

Because NEPA requires "some quantified or detailed information" supporting the conclusions of an EA,¹¹⁷ the District must provide information to support its conclusion that heritage and cultural resources will not be impacted.¹¹⁸ Additionally, without this analysis, the District cannot ensure consistency with the Forest Plan, as required by NFMA.¹¹⁹

D. Climate Change

The Draft EA does not include a single reference to climate change impacts from the proposed project. As we have already explained, a "focused" EA is still an EA and as such it must meet the requirements of NEPA; i.e. informing the public and supporting with evidence a finding of no significant impact. Failure to discuss at all the project impacts on climate change violates these requirements.

The Forest Service has recognized the importance of incorporating climate change considerations into its land management decisions and in turn has provided a number of resources to guide project level analysis of climate change impacts. For example, the Forest Service Roadmap for Responding to Climate Change discusses management actions for addressing climate change, including "[i]ncorporating climate-related vulnerabilities and uncertainties into ... project-level environmental analyses" and "[d]iscussing how a range of uncertain future climate conditions might affect the expected consequences of the proposed activities."¹²⁰ The Forest Service also published guidance for navigating the climate change performance scorecard on national forests. This guidance recognized the critical role our nation's forests play in storing carbon and helping to reduce greenhouse gases that are released into the atmosphere.¹²¹

The Scorecard also stresses the importance of carbon assessments and explains how they can help the Forest Service to implement management activities with the potential to reduce carbon emissions.¹²² Indeed, the Forest Service recently conducted a carbon assessment for the

¹¹⁶ See Forest Plan 3-30.

¹¹⁷ Klamath-Siskiyou Wildlands Ctr. v. Bureau of Land Mgmt., 387 F.3d 989, 993 (9th Cir. 2004).

¹¹⁸ See Found. for N. Am. Wild Sheep v. U.S. Dep't of Agric., 681 F.2d 1172, 1178 (9th Cir. 1982) (holding that failure to address "certain crucial factors, consideration of which [is] essential to a truly informed decision whether or not to prepare an EIS," renders an agency's EA arbitrary in violation of NEPA).

¹¹⁹ See e.g. Forest Plan at 2-50 (FW-204) (Projects are designed to avoid, minimize, or mitigate negative effects on potentially significant heritage resources.).

¹²⁰ USDA Forest Service, National Roadmap for Responding to Climate Change 27 (July 2010), <https://www.fs.fed.us/climatechange/pdf/roadmap.pdf>.

¹²¹ See Office of Climate Change Advisor, U.S. Forest Serv., *Navigating the Climate Change Performance Scorecard* at 40 (2011).

¹²² Id.

GWJNF. The assessment includes discussion of the carbon stock on the GWJNF, and factors influencing forest carbon, such as timber harvesting, climate change, and other environmental effects.¹²³ This assessment provides a reference for the District to help summarize identified climate change issues in connection with forest management and to guide discussion in the EA of the issues specific to the proposed action. For example, the assessment recognized that "timber harvest has been the dominant disturbance type detected on the George Washington and Jefferson [National Forests]."¹²⁴ Accordingly, the District should include a discussion of how the proposed 1,200 acres of regeneration harvest relates to the JNF carbon stock. In addition to utilizing this assessment in discussing climate change impacts, the District should use the assessment to integrate carbon stewardship with its management proposals for the area.

To be clear though, the District cannot simply state that it is "tiering" to the GWJNF Carbon Assessment for its climate change impacts analysis. The assessment provides only an environmental baseline of carbon stock on the National Forests and discussion of past and future factors influencing forest carbon. Because the assessment does not provide any analysis of how future factors, such as timber harvest, will actually impact forest carbon, the District cannot tier to this document as an acceptable assessment of climate change impacts.¹²⁵

Additionally, portions of the assessment are not consistent with best available science. For example, best available science demonstrates that older forests are important for carbon sequestration, calling into question the assessment's claim that older forests may cause the carbon accumulation rate to decline.¹²⁶ Indeed, research indicates that ending timber harvest on public lands in the U.S. would *increase* forest carbon sequestration by 10%.¹²⁷ Other research indicates late successional and old-growth forests in the North Eastern U.S. had much *higher* carbon stores than younger forests.¹²⁸

The District should also go beyond the narrow focus of the carbon assessment and consider other climate change related impacts, such as impacts to rare and sensitive species, restoration of habitat, potential increases in fragmentation, resilience to future climate change effects, and cumulative impacts. Resiliency to climate change is a particularly important factor to consider at the project planning level. Several stands in the project area are older stands, including stands in each of the working areas. And research demonstrates that disturbance of ecosystems through logging older stands can undermine a forest's resilience to climate change. A recent study found that older forests are less vulnerable to climate change than younger

¹²³ See Forest Carbon Assessment for the George Washington and Jefferson National Forests in the Forest Service's Southern Region (Oct. 2019).

¹²⁴ *Id.* at 11.

¹²⁵ See 40 C.F.R. § 1502.20 (tiering is permissible when "a broad environmental impact statement has been prepared ... and a subsequent statement or environmental assessment is then prepared on an action included within the entire program.").

¹²⁶ GWJNF Carbon Assessment 17.

¹²⁷ Depro, Brooks M. et al., Public land, timber harvests, and climate mitigation: Quantifying carbon sequestration potential on U.S. public timberlands 1122-1134, Forest Ecology and Management 255 (2008).

¹²⁸ Gunn, John S. et al., Late-successional and old-growth forest carbon temporal dynamics in the Northern Forest (Northeastern USA), Forest Ecology and Management (2013).

forests, and that resiliency increased with age.¹²⁹ Trading stands with older forest structure for early successional habitat has the potential to diminish the forest's capacity and resiliency to withstand overall changes from climate. The District must include a discussion of potential impacts to forest resilience to climate change in the EA.

Additionally, climate change is a function of the impacts of not just one isolated project, but of the cumulative impacts from actions across the forest and around the world. Cumulative impacts can result from *individually* minor, but collectively significant actions taking place over a period of time.¹³⁰ Indeed, courts have explained that the "impact of greenhouse gas emissions on climate change is precisely the kind of cumulative impacts analysis that NEPA requires agencies to conduct."¹³¹ So too are the impacts of timber harvests and forest management on climate change. Under NEPA, the District must consider "the impact on the environment which results from the incremental impact of the [proposed] action when added to other past, present, and reasonably foreseeable future actions."¹³²

In sum, the District's failure to consider climate change ignores the wide recognition that our national forests play an important role in mitigating climate change and that forest management plays an important role in both mitigating the impacts of climate change and ensuring our forests are resilient to these impacts. This failure violates NEPA.

E. Locally Rare Species

Approximately 393 species fall into the "locally rare" category on the GWJNF. Yet, the Draft EA makes no mention of locally rare species in the project area or potential impacts to such species. Are there any locally rare species in the project area? Given the limited information in the Draft EA, it is not clear whether the District has conducted adequate surveys for these species or adequately provided for their protection from negative impacts of the proposed management. NFMA, the Forest Plan, and NEPA require more.¹³³

The Forest Service generally considers species ranked at S1 or S2 with a global rank of G4 or less as locally rare species.¹³⁴ Based on these criteria, Virginia Department of Conservation and Recreation data indicate that 74 such species occur in Bland, Pulaski, and Wythe Counties.¹³⁵ To the extent the District determined that none of these locally rare species occurred in the project area, the Draft EA must, at a minimum, state this finding and explain

¹²⁹ Dominik Thom, et al., The climate sensitivity of carbon, timber, and species richness covaries with forest age in boreal-temperate North America, Global Change Biology, 2019; DOI: 10.1111/gcb.14656.

¹³⁰ 40 C.F.R. § 1508.7 (emphasis added).

¹³¹ Ctr. for Biological Diversity v. NHTSA, 538 F.3d 1172, 1217 (9th Cir. 2008).

¹³² 40 C.F.R. § 1508.7.

¹³³ See 16 U.S.C. § 1604(g)(3)(B) (NFMA requires the Forest Service to "provide for diversity of plant and animal communities."); see, e.g., Forest Plan at 3-153 (9A1 standards include vegetation management activities that "[i]mprove ... locally rare species habitat"); see also Klamath-Siskiyou Wildlands Ctr., 387 F.3d at 993.

¹³⁴ See e.g., N. Shenandoah Final EA 67.

¹³⁵ Va. Dep't of Conservation and Recreation, Species/Communities Database Search, <https://vanhde.org/species-search>.

how the District reached this determination.

For example, the North Shenandoah Final EA that was recently released details the surveys conducted in the project area for locally rare species, who conducted the surveys, and when they were conducted, as well as the results of the surveys.¹³⁶ The Final EA goes on to discuss potential project impacts to these species.¹³⁷ Did the District similarly conduct surveys for locally rare species in the project area for Eastern Divide Phase II? If not, how was the District able to conclude there were no species warranting analysis in the Draft EA? Without answers to these questions, and without access to the Draft BE/BA, it is not clear whether the proposed project satisfies NEPA, NFMA, or the Forest Plan. At minimum, an EA must "provide sufficient evidence and analysis for determining whether" the environmental impact will be significant.¹³⁸

F. Karst

The District also failed to consider karst, despite the fact that Bland, Giles, Wythe, and Pulaski Counties all contain significant karst terrain.¹³⁹ If the District concluded there were no karst features in the project area, it must explain how it reached this conclusion. The District must provide this site-specific information about the project area to ensure that "individual geographic conditions" and the "impact on local environments" are adequately assessed.¹⁴⁰ For example, it is important to know whether there is karst terrain in the project area in order to analyze the risk for contamination and other impacts to groundwater. The District should consider the risk of contamination from its proposed herbicide use, discussed more fully in Section 5.D: Herbicides, and also from leaks or spills of petroleum products from logging equipment and vehicles. Additionally, in order to comply with the Forest Plan, the District must know whether there is karst terrain in the area.¹⁴¹

5. Inadequate analysis

The Draft EA inadequately analyzes other impacts across the project area. An incomplete analysis of environmental effects, or the efficacy of measures to reduce the severity

¹³⁶ North Shenandoah Final EA 77-78.

¹³⁷ Id.

¹³⁸ 40 C.F.R. § 1508.9(a)(1).

¹³⁹ Va. Dep't of Mines, Minerals, and Energy, Division of Geology and Mineral Resources, Sinkholes and Karst Terrain, <https://www.dmme.virginia.gov/dgmr/sinkholes.shtml>.

¹⁴⁰ See Nat. Res. Def. Council v. Morton, 388 F. Supp. 829, 838-41 (D. D.C. 1974) aff'd without opinion, 527 F.2d 1386 (1976), cert. denied, 427 U.S. 913 (1976) (to meet NEPA requirements, Forest Service must perform sufficiently site-specific analyses.); Nat'l Audubon Soc'y v. Dep't of the Navy, 422 F.3d 174, 187-189 (4th Cir. 2005).

¹⁴¹ Forest Plan 2-20 (FW-63) (A minimum of 200 foot buffers are maintained around cave entrances, sinkholes, and cave collapse areas known to open into a cave's drainage system. There are no soil-disturbing activities or harvest of trees within this buffer. Wider buffers are identified through site-specific analysis when necessary to protect caves from potential subterranean and surface impacts. Perennial, intermittent, channeled ephemeral stream standards will apply beyond the first 200 feet.); Forest Plan 2-29 (FW-106) ("[n]o herbicide is broadcast on ... sinkholes.").

of those effects, “undermine[s] the ‘action-forcing’ function of NEPA,” because “neither the agency nor other interested groups and individuals can properly evaluate the severity of the adverse effects.”¹⁴² Indeed, “[t]he hallmarks of a ‘hard look’ are thorough investigation into environmental impacts and forthright acknowledgment of potential environmental harms.”¹⁴³ NEPA requires “quantified or detailed information” to support the conclusions of an EA.¹⁴⁴ Specifically, the District failed to adequately analyze impacts to water quality and soil, threatened, endangered, and sensitive species, herbicides and non-native invasive species, and old growth. The District must issue a revised Draft EA with a more thorough analysis of these impacts.

A. Water quality and soil

For the reasons discussed below, the District must issue a revised Draft EA that includes (1) a water quality analysis for the entire project area, rather than only the Dismal Creek area; (2) acknowledgement of limited effectiveness of BMP; (3) consideration of erosion and sedimentation risks based on soil type and slopes; (3) and consideration of cumulative impacts to water quality and soils.

i. **Geographic scope of analysis**

The District water quality and sedimentation analysis is inadequate. The most immediate problem with the District's water quality analysis is that it only considered the Dismal Creek area and nine channel crossings from temporary roads, bladed skid trails, and unbladed skid trails in the other working areas. This does not begin to accurately document the numerous risks to water quality posed by sedimentation from 1,200 acres of regeneration harvest.¹⁴⁵ And the District concluded its minimal “water quality analysis” with a conclusory statement that “[i]t is anticipated that water quality may be affected by sediment loading over the short-term, but measurably long-term water quality effects should not occur if Forest Plan standards and Virginia's Forestry BMP are adhered to.”¹⁴⁶

This is not an acceptable analysis. There is no evidence to explain what led the District to reach this conclusion for the nine channel crossings it considered or for the numerous other sedimentation risks posed by the project. In order to adequately inform the public and support a finding of no significant impact, the District must conduct an actual, detailed sedimentation analysis for the entire project.

ii. **BMP effectiveness**

There are a number of other issues that the District should address before conducting subsequent water quality analyses for the rest of the project area. First, the model employed by

¹⁴² Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 352 (1989) (citations omitted)

¹⁴³ Nat'l Audubon Soc'y, 422 F.3d at 187.

¹⁴⁴ Klamath-Siskiyou Wildlands Ctr., 387 F.3d at 993; Seattle Audubon Soc'y v. Moseley, 798 F. Supp. 1473, 1479 (W.D. Wash. 1992) (agency cannot sweep complex and troublesome issues under the rug).

¹⁴⁵ Soil and Water Resources Report 5.

¹⁴⁶ Id. at 9.

the District assumes that Virginia BMPs will be properly implemented and effective, but the District does not disclose, discuss, or evaluate the actual in-field effectiveness of BMPs, generally or specifically in Virginia. This failure results in an analysis that inappropriately relies upon unrealistic BMP effectiveness, neglecting to account for the probability and effects of BMP failures. This is a critical error given the frequent failure of BMPs. These failures are the result of a number of factors, including BMPs not being followed or fully implemented, BMPs that are inappropriate for a given situation, a lack of maintenance and follow-up, and activities occurring in inappropriate situations.

Experts considering other timber management projects on the Jefferson National Forest have explained that BMPs are in fact *rarely* effective in preventing pollution of streams, rivers, and other water bodies associated with logging and road building.¹⁴⁷ Disclosing these limitations and proposed mitigation to address likely BMP failures must be included in the EA. Agencies may use mitigation measures to justify a finding of no significant impact only when their efficacy is “supported by substantial evidence.”¹⁴⁸ And NEPA requires agencies to disclose relevant shortcoming in data or models, such as the ineffectiveness of BMPs.¹⁴⁹

Indeed, the Fourth Circuit recently found the Forest Service’s reliance on overly optimistic assumptions of the adequacy of erosion control devices (ECDs), despite evidence to the contrary, was arbitrary and capricious in violation of NEPA.¹⁵⁰ The District has neither provided evidence to support the efficacy of BMPs, nor disclosed the shortcomings in its analysis that assumes their effectiveness. The sedimentation analysis is also inconsistent with the Forest Plan and violates NFMA’s mandate that management activity maintain or restore water quality because its analysis of sedimentation simply has not demonstrated that these harms will not occur as a result of the proposed project.¹⁵¹ At a minimum, the District must disclose whether its BMPs have succeeded or failed in the past and how this history bears on the current project.¹⁵²

¹⁴⁷ See attached Sulkin Statement ¶ 25.

¹⁴⁸ National Audubon Soc’y v. Hoffman, 132 F.3d 7, 30 (2nd Cir. 1997) (Without “substantial evidence to support the efficacy” of the mitigation measure at issue in that case, including monitoring to determine how effective it was, the Forest Service’s consideration of the proposed action was inadequate and violated NEPA).

¹⁴⁹ Lands Council v. Powell, 395 F.3d 1019, 1032 (9th Cir. 2005); see also Seattle Audubon Soc’y, 798 F. Supp. at 1479 (agency cannot sweep complex and troublesome issues under the rug); Hughes River Watershed Conservancy v. Glickman, 81 F.3d 437, 445-446 (4th Cir. 1996) (agency must disclose, not ignore, reputable scientific criticism.).

¹⁵⁰ Cowpasture River Pres. Ass’n v. Forest Serv., 911 F.3d 150 (4th Cir. 2018).

¹⁵¹ 36 C.F.R. § 219.8 (Forest Service regulations requiring Forest Plans to include component to maintain or restore soil and water quality); Forest Plan at 2-6 (“manage soils to ... not contribute sediment to streams at levels which negatively effect [sic] instream uses and lifecycles of aquatic species.”); 16 U.S.C. § 1604(g)(3)(E)(i).

¹⁵² See Robertson, 490 U.S. at 352 (1989) (finding incomplete discussion of mitigation measures violates NEPA); Idaho Sporting Congress v. Thomas, 137 F.3d 1146, 1151 (9th Cir. 1998) (overruled on other grounds by Lands Council v. McNair, 537 F.3d 981 (9th Cir. 2008)) (“Without analytical data to support the proposed mitigation measures, we are not persuaded

Recent field review of the Phase I project area provides examples that further underscore how unrealistic the District's blanket reliance on BMPs is. For example, in multiple areas of the No Business working area, buffers around ephemerals were often less than the 25 feet required by the Forest Plan. In other areas, it was not clear how the District justified its classification of streams, including streams classified as ephemeral (with an associated 25 foot buffer) rather than more appropriately classified as a spring/seep, which would get a minimum 100 foot buffer. If the District cannot ensure adequate implementation of riparian buffers or accurate stream classification, it cannot rely on these types of protections to justify a finding of no significant impact. As the District is aware, Phase I implementation also caused water quality issues by failing to maintain roads with adequate drainage. Among the most egregious were the violations that occurred when loggers actually *removed* mitigation devices, such as sediment socks, from the project area.¹⁵³

The numerous failures along the Mountain Valley Pipeline route in Virginia also illustrate how unrealistic the District's reliance on BMPs is. Within the first few months of conducting ground disturbing activities in Virginia, Virginia Department of Environmental Quality (DEQ) observed eight violations of MVP's annual standard and specifications, site specific erosion and sediment control and stormwater management plans, and various state water quality laws and regulations.¹⁵⁴ These violations were the result of improperly installed ECDs, as well as properly installed ECDs that were simply ineffective and overwhelmed, resulting in sediment ranging from 1 to 11 inches in depth in a number of streams.¹⁵⁵ Given these common failures of erosion control devices and BMPs in similar terrain, the District must discuss how it will address these issues and adequately protect water quality during implementation of the Phase II project.

iii. Erosion and sedimentation hazards

The Draft EA does not adequately analyze erosion and sedimentation risks based on soils and slopes within the proposed harvest units. Nor does the Draft EA consider whether the soil and slope conditions in the project area require additional measures to mitigate these risks. But NEPA and the NFMA require the District to provide such site-specific information and insight in order to meaningfully inform the public of the risks posed to water quality from erosion and sedimentation, as well as the risks posed to soil productivity in the area.

The Forest Plan requires examination of both slope *and* the characteristics and limitation of soil types.¹⁵⁶ This information is necessary to an informed effects analysis because different

that they amount to anything more than a 'mere listing' of good management practices.").

¹⁵³ See attached USDA Forest Service, Field Review Pocahontas Timber Sale Unit 1.

¹⁵⁴ Complaint at 10-13, Paylor v. Mountain Valley Pipeline, LLC, No. CL18006874-00 (Va. Cir. Ct. Dec. 7, 2018).

¹⁵⁵ Id. at 10-13.

¹⁵⁶ See Forest Plan at 2-33 (FW-111) ("Use advanced harvest systems on sustained slopes over 20 percent *when soils have a high erosion hazard or are failure-prone.*") (emphasis added); *id.* at 2-34 (FW-118) (No heavy equipment is used for site preparation on sustained slopes over 35 percent or sustained slopes over 20 percent when soils have a high erosion hazard or are failure-prone.") *id.* at 2-39 ("FW-150: Mechanical fuels treatments are prohibited on sustained slopes

types of soils have different erosion hazards, thereby impacting sedimentation rates. In violation of this standard, the Draft EA fails to (1) disclose and analyze which soil types in the proposed harvest units have a high erosion hazard or are failure prone, and then (2) combine that data with a slopes analysis to determine where advanced harvest systems are required.

Because the Draft EA does not contain this necessary information, we are gathering and analyzing GIS information to identify potential high-risk sites in the project area that have moderate to severe erosion hazards and slopes over 35 percent. And our analysis indicates that there is good reason for concern, with many project areas containing soil characteristics with a *severe* erosion hazard. And when considered in conjunction with slopes, there is even greater cause for concern. For example, units 4 and 5 in Tunnel Hollow, which are in Management Prescription 9A1: Source Water Protection Watershed, have soils with a high potential for erosion *and* appear to be along a ridge, with some slopes great than 35%. Following these comments, we will send erosion hazard maps for each project area to the District to help better inform its analysis. The District cannot justify significant ground disturbance in a unit with highly erodible soils and steep slopes, which is located in a management area that emphasizes water quality protection. And the Forest Plan requires the District to use advance harvest methods in areas with highly erosive soils and steep slopes.¹⁵⁷ These issues underscore why considering soil type, as well as soil type in conjunction with slopes, is critical to an adequate and accurate sedimentation analysis.

By disregarding information relevant to compliance with the Forest Plan standards, the District also risks violating NFMA, which requires that forest management decisions be consistent with the Forest Plan.¹⁵⁸ Additionally, NEPA requires this analysis to assess the impacts of the proposed logging on water resources. Indeed, “[t]he thrust of NEPA is that all pertinent environmental data be gathered in one place ... constituting a discussion of all relative environmental impacts of a proposed course or alternative courses of action which reflects that the agency has given all pertinent environmental matters a ‘hard look.’”¹⁵⁹ And “NEPA procedures must ensure that environmental information is available to public officials and citizens before decisions are made and before actions are taken. The information must be of high quality. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA.”¹⁶⁰

The Draft EA failure to include critical information on slopes and soil type in its limited sedimentation analysis for the Dismal Area, as well as its unjustified reliance on BMPs is arbitrary and capricious. And the District’s failure to conduct any actual sedimentation analysis

over 20 percent when soils have a high erosion hazard or are failure-prone.”); *id.* at 2-7 (“FW-6: Locate and design management activities to avoid, minimize, or mitigate potential erosion.”).

¹⁵⁷ Forest Plan 2-33 (FW-111).

¹⁵⁸ 16 U.S.C. § 1604(i).

¹⁵⁹ *Ayers v. Espy*, 873 F. Supp. 455, 468 (D. Colo. 1994) (citation omitted); *Leavenworth Audubon Adopt-A-Forest Alpine Lakes Prot. Soc. v. Ferraro*, 881 F. Supp. 1482, 1490 (W.D. Wash. 1995) (even though Forest Service assessed the percentage of soils in disturbed conditions, the agency still violated NEPA because it failed to adequately consider and document the project’s impact on those soil conditions”).

¹⁶⁰ 40 C.F.R. § 1500.1(b).

for the rest of the project area precludes meaningful public involvement and cannot support a finding of no significant impact. The District must issue a revised Draft EA that considers the presence of highly erosive soils in the areas proposed for timber harvest, the realistic efficacy of BMPs, and the likely sedimentation risk from timber harvest, skid roads, and temp roads, and other soil disturbing activities in each project area.

iv. Soils

The District's soil analysis is inadequate. The NFMA requires the District to "insure" that timber is harvested only where "soil, slope, or other watershed conditions will not be irreversibly damaged[.]"¹⁶¹ The agency also must "insure research on and (based on continuous monitoring and assessment in the field) evaluation of the effects of each management system to the end that it will not produce substantial and permanent impairment of the productivity of the land."¹⁶² Courts have confirmed that the NFMA productivity requirement applies to soil productivity.¹⁶³

There are a number of significant problems with the District's soil analysis. First, by not including the Dismal Creek area, the District failed to consider at all the soil impact in the Dismal Creek area. At the start of the Soil & Water Resources Report, the District notes that a separate analysis was performed for the proposed Dismal Area units and thus further analysis for the Dismal Area is not included in the report. But the separate analysis for the Dismal Area was a sedimentation analysis only; it does not discuss the impacts to soils in the Dismal area. The upshot of this is that the District has failed to conduct a soils analysis for roughly half of the project. The District must conduct a soils analysis for the Dismal Creek area.

The soils analysis the District conducted for the rest of the project area is inadequate. First, excluding the Dismal Area means the District would have considered 31 units in its soils analysis. Yet, the Draft EA only discusses 30 units.¹⁶⁴ Which unit was excluded from the analysis and why? Second, the analysis fails to discuss the existing soil conditions, including the particular soil types and risks associated with each. By contrast and for example, the North Shenandoah Final EA notes that the soils in the project area "are generally moderate to deep ... with silt loam and sandy loam textures, with sandy soils being larger and coarse grained."¹⁶⁵ The Final EA goes on to discuss the predominant soil types in the project area and notes that the project record includes soil map unit descriptions, acreages for soils, and other soil characterizes.¹⁶⁶

¹⁶¹ 16 U.S.C. § 1604(g)(3)(E)(i).

¹⁶² 16 U.S.C. § 1604(g)(3)(C).

¹⁶³ See Ecology Ctr. v. Austin, 430 F.3d 1057, 1062 (9th Cir. 2005) cert. denied sub. nom. Mineral County v. Ecology Ctr., Inc., 549 U.S. 1111 (2007), overruled on other grounds by Lands Council v. McNair, 537 F.3d 981 (9th Cir. 2008) (Among the "substantive requirements" of NFMA, "the Forest Service must maintain soil productivity. 16 U.S.C. § 1604(g)(3)(C)."); Friends of the Columbia Gorge, Inc. v. Elicker, 598 F. Supp. 2d 1136, 1155 (D. Or. 2007) ("NFMA also requires USFS to ensure . . . the productivity of the soil.").

¹⁶⁴ Soil and Water Resources Report 4.

¹⁶⁵ N. Shenandoah Final EA 44.

¹⁶⁶ Id.

The District also fails to explain the adverse impacts caused by soil disturbance and compaction. Again, by contrast, the North Shenandoah Final EA discussed specific problems caused by soil compaction, such as decreased total pore space, decreased water infiltration rates, and gas exchange, all of which are important for healthy functioning soil.¹⁶⁷ Other problems include reducing the ability of soils to exchange oxygen and carbon dioxide thus affecting the ability of soil organisms to survive.¹⁶⁸ This type of information is critical to informing the public of the adverse impacts and ensuring meaningful public involvement.

The District's analysis also does not consider the impacts from various activities in the project area. The North Shenandoah Final EA underscores why this type of discussion is important, including a discussion of soil disturbance from: mechanical vegetation treatments; road decommissions, maintenance, reconstruction, new and temporary construction; prescribed burn; and non-mechanized vegetation treatments.¹⁶⁹ It also explains which activities would result in most of the negative impacts. This is important because it allows the District to discuss meaningful mitigation measures and alternatives.¹⁷⁰

The District's analysis for this project is no more than a recitation of Forest Plan standards with no actual analysis or useful information to inform the public. It is not clear (1) which units were actually analyzed, (2) the types of soil present in the project area and unique risks involved, (3) the actual impacts that result from soil disturbance and compaction, other than erosion, or (4) the activities that cause the most disturbance and means by which the District can mitigate or avoid such disturbance. NEPA and the NFMA require far more than what the District has provided in its soils analysis for part of the project area.

v. Cumulative Impacts

A "cumulative impact" is defined as an impact that "results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions."¹⁷¹ The District has failed to include such an analysis for water quality in the project area.

The District is proposing significant management in this area over the next ten years. In addition to this project, the District has proposed Phase I of the Eastern Divide project, as well over 60,000 acres of prescribed fire. Many of the working areas overlap, including the waterbodies that will be impacted in the project area. For example, Dismal Creek and No Business Creek both flow into Kimberling Creek. Accordingly, in order to adequately consider the cumulative impacts on water quality in the project area, the District must consider the impacts from Phase I and the prescribed fire, as well. This is particularly important given that the District used a CE for Phase I and the prescribed fire and so has not provided the public with a full impacts analysis of those projects, at all.

¹⁶⁷ N. Shenandoah Final EA 46.

¹⁶⁸ *Id.*

¹⁶⁹ *Id.* at 45-49

¹⁷⁰ *Id.* at 46 (Because "[m]ost of the negative impacts occur from landing construction, main skid trails, and temporary road construction[,] ... [w]here feasible, existing landings and skip trails would be reused.")

¹⁷¹ 40 C.F.R. § 1508.7.

B. Threatened, Endangered, and Sensitive Species

The Draft EA does not adequately analyze impacts on threatened, endangered, and sensitive species.

i. **Draft BE/BA**

The Draft EA contains very little information about the possible impacts of the proposed action on threatened, endangered, and sensitive (TES) species. Although the Draft EA states that the District has prepared a BE/BA, we have not been able to review it. We understand that the District intends to make the full BE/BA report available with the Final EA.¹⁷² However, it would have been useful for the District to make the BE/BA, even if in draft form, available on the project website during the comment period. The ability to review and comment on the BE/BA is necessary to provide an opportunity for well-informed, meaningful public comment on the project as required by NEPA.¹⁷³ Additionally, posting the BE/BA to the project website would save the District time and energy spent responding to individual requests for these documents.

We also wish to note that withholding the BE/BA is contrary to the usual practice among national forests in the Southern Appalachians. Elsewhere in the region, forests routinely post the Draft EA, with BE, to the website during the public comment period (e.g., the Cherokee National Forest in Tennessee and the Nantahala-Pisgah National Forest in North Carolina). The BE is then included as an appendix to the Final EA.

Since we have not seen the BE/BA in any form, we cannot conclude that the District has satisfied its obligations under NFMA, NEPA, or the ESA. However, the Draft EA's conclusory analysis of impacts on TES species is startling. Agency regulations require that forest plans "include plan components to maintain or restore the diversity of ecosystem and habitat types" in the plan area.¹⁷⁴ To implement this direction, the Forest Service Manual requires the agency to maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on national forests.¹⁷⁵ The Manual describes a viable population as one "that has the estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species throughout its existing range (or range required to meet recovery for listed species) within the planning area."¹⁷⁶ Several TES species were found within the project area. Yet, the District provided little

¹⁷² See Draft EA 22.

¹⁷³ NEPA requires the District to take a "hard look" at environmental consequences "before decisions are made in order to ensure that those decisions take environmental consequences into account." See *Wilderness Watch & Pub. Employees for Env'tl. Responsibility v. Mainella*, 375 F.3d 1085, 1096 (11th Cir. 2004) (emphasis in original). This "hard look" must include "some quantified or detailed information" supporting the conclusions of an EA. *Klamath-Siskiyou Wildlands Ctr.*, 387 F.3d at 993 (9th Cir. 2004) (citations omitted).

¹⁷⁴ 36 C.F.R. § 219.9(a)(2).

¹⁷⁵ FSM 2670.22, 2672.1.

¹⁷⁶ FSM 2670.5; see also 36 C.F.R. 219.19 (defining viable population as "a population of species that continues to persist over the long term with sufficient distribution to be resilient and adaptable to stressors and likely future environments").

analysis of potential impacts to these species, instead referencing the incomplete and unavailable BE/BA for its analysis. As discussed more in Section 6: Dismal Creek Issues, the District should make the full BE/BA report available, even if in draft form, during the public comment period.

ii. TES impacts

Based on the limited information available in the Draft EA, it is difficult to know whether the project will have a significant impact on TES species. The District offers nothing more than conclusory findings. For example, the District states the "[p]roject is considered beneficial to" the monarch butterfly.¹⁷⁷ What evidence does the District have to support this conclusion? How will the project benefit the monarch butterfly? What about potential adverse impacts, such as equipment crushing larvae or individual butterflies?

The Draft EA also claims "[t]he project does not impact known individuals or populations" of American barberry.¹⁷⁸ But without surveys, how can the public or District know where populations of American barberry exist? NEPA requires this information be available to the public "*before* decisions are made and before actions are taken."¹⁷⁹ Additionally, the District should include an effects determination for sensitive species as it has for federally threatened and endangered species rather than simply indicating "N/A." As an example, the North Shenandoah Final EA indicated whether the project "may impact" or had "no impact" on sensitive species, defining "may impact" as "may adversely impact individuals, but not likely to result in a loss of viability in the planning area, nor cause a trench to federal listing or a loss of species viability range-wide."¹⁸⁰

Additionally, green salamanders are known or likely to occur in Bland and Wythe Counties.¹⁸¹ Green salamanders are Region 8 sensitive species. Do they exist in the project area? Did the District survey for green salamanders?

The Draft EA also fails to address the concerns we raised in scoping comments about exceeding the annual acreage limitations for timber harvest.¹⁸² As you know, the Incidental Take Statement (ITS) for the Indiana bat assumes taking of bats through habitat manipulation on up to 16,800 acres per year.¹⁸³ The ITS estimated that all habitat manipulation activities excluding prescribed fire would impact approximately 1,800 acres per year.¹⁸⁴ Between Phase I

¹⁷⁷ Draft EA 24.

¹⁷⁸ *Id.* at 25.

¹⁷⁹ 40 C.F.R. § 1500.1(b) (emphases added).

¹⁸⁰ North Shenandoah Final EA 76.

¹⁸¹ Va. Herpetological Society, *Salamanders of Virginia*, https://www.virginiaherpetologicalsociety.com/amphibians/salamanders/salamanders_of_virginia.htm

¹⁸² June 24, 2019 Scoping Comments with Declaration of Rose-Marie Muzika, Ph.D. at 29.

¹⁸³ U.S. Fish and Wildlife Service, Biological Opinion for 2003 Revised Jefferson National Forest Land and Resource Management Plan 33 (Jan. 13, 2003).

¹⁸⁴ *Id.* at 33, 24 (prescribed burning during summer could: (a) kill or injure Indiana bat by burning or smoke inhalation, especially death to young bats that cannot fly; (b) consume standing snags, thus removing potential roost trees; and (c) kill suitable living roost trees by

and II along, the District proposes over 2,400 acres of timber harvest, which will occur in the same general timeframe. And this does not take into account timber harvest that other Districts within the Jefferson National Forest (JNF) are planning. Exceeding limits in the ITS would constitute an unlawful take under the Endangered Species Act and increasing this limit would require re-initiation of consultation with the U.S. Fish and Wildlife Service and modification of the Biological Opinion and ITS.¹⁸⁵ The District must address whether its proposed timber harvest will violate the Endangered Species Act.

Lastly, impacts to the endangered candy darter are discussed in more detail in Section 6: Dismal Creek Issues.

Ultimately, it is difficult for the public to meaningfully comment on the District's TES analysis when it provides minimal information and otherwise references a BA/BE that is incomplete and not publicly available. The District's vague and conclusory TES analysis hinders rather than supports NEPA's mandate that the public be meaningfully involved.

C. Old Growth

We have a keen interest in the identification and protection of existing old growth in the project area and the GWJNF generally. We commend the District for excluding probable old growth at the start of project planning using GIS and desktop identification. But the District must go further to ensure it does not log old growth in the project area. Old growth is identified on the ground and as a result, the District must conduct on the ground surveys in all units prior to logging.

We also strongly urge the District to commit in the EA that no old growth will be logged, regardless of when it is identified. Old growth communities "are rare or largely absent" in Southeastern forests, perhaps occupying about one half of one percent (0.5%) of the total forest acreage.¹⁸⁶ For that reason, the agency is making efforts to address the restoration of old growth, which is a "missing portion of the southern forest ecosystems."¹⁸⁷ Old growth forest takes centuries to develop, so it is irreplaceable on a human time scale if it is replaceable at all.¹⁸⁸ Given the rarity and importance of old growth forest in the Southern Appalachians and the little existing old growth forest that has been identified in the field on the GW, it would be difficult to harvest any existing old growth without having significant impacts. These circumstances would likely require an EIS.¹⁸⁹

heat/flames).

¹⁸⁵ Id. at 35.

¹⁸⁶ USDA-Forest Service, Southern Region, Guidance for Conserving and Restoring Old-Growth Forest Communities in the Southern Region: Report of the Region 8 Old-Growth Team, 1 (June 1997).

¹⁸⁷ Id.

¹⁸⁸ See Neighbors of Cuddy Mountain, 137 F.3d at 1382; Idaho Sporting Congress v. Alexander, 222 F.3d 562 (9th Cir. 2000).

¹⁸⁹ When assessing whether there may be significant impacts, CEQ regulations require the District to consider the intensity or severity of impacts on historic or cultural resources as well as ecologically critical areas. 40 C.F.R. § 1508.27. This includes considering the severity of

Absent this commitment and completion of the surveys, the District cannot justify a finding of no significant impact.

D. Herbicides

The District proposes to apply herbicides on up to 883 acres.¹⁹⁰ The scant analysis of herbicide use in the Soil and Water Quality Analysis, however, is entirely inadequate to conclude that such widespread usage would have no significant impact. Nor does it even begin to inform the public about potential impacts from herbicide use.

NEPA requires environmental analysis to be site-specific, so that “individual geographic conditions” and the “impact on local environments” can be adequately assessed.¹⁹¹ This project-specific analysis must include an assessment of the environmental conditions in this specific, local project area and an evaluation of the likely impacts on this site. Such assessment should include “on the ground” site investigation of key environmental aspects.¹⁹² The District's lack of analysis regarding herbicide use does not meet this mandate. For example, the Draft EA should include a discussion of issues related to the safety, effects on non-target species, and cumulative impacts of the proposed ~800 acres of herbicide use in the project area. And what is the extent of existing and proposed herbicide usage in the project area? Without this information, it is impossible for the public to meaningfully comment and adequately analyze cumulative impacts.

The District must also consider impacts to groundwater in karst terrain from herbicide use in the project area. “It is a truism that karst aquifers are more vulnerable to contamination than other types of aquifers.”¹⁹³ The District’s single sentence noting that triclopyr is not soil active does not excuse the District from conducting the required impacts analysis. According to the National Pesticide Information Center, triclopyr is moderately soluble in water and has a moderate potential to reach shallow groundwater in soils.¹⁹⁴ Moreover, it “is associated with long-term persistence if the chemical reaches groundwater.”¹⁹⁵ The movement of triclopyr in soils depends on the soil type and properties, further underscoring why the District must consider soil type in the project area.¹⁹⁶

impacts on old growth forest, which holds biological, wildlife, recreational, research, scientific, educational, cultural, aesthetic, and spiritual values. See Region 8 Guidance at 12-14.

¹⁹⁰ Draft EA 4.

¹⁹¹ Nat. Res. Def. Council v. Morton, 388 F. Supp. 829, 838-41 (D.D.C. 1974).

¹⁹² Nat’l Audubon Soc’y, 422 F.3d at 187-189.

¹⁹³ D.J. Vesper, et al. Contaminant transport in karst aquifers, Theoretical and Applied Karstology, 13, 63-73, 64 (2000); see also, I. Y. Padilla and D.J. Vesper, Fate, Transport, and Exposure of Emerging and Legacy Contaminants in Karst Systems: State of Knowledge and Uncertainty (2018) (case study in Puerto Rico, which was “applicable to many sites,” recognized that “[t]he hydrogeological characteristics of karst aquifers ... impact of a high vulnerability for contamination.”).

¹⁹⁴ Nat’s Pesticide Info. Center, Herbicide Properties Tool: Triclopyr, <http://npic.orst.edu/HPT/>.

¹⁹⁵ Id.

¹⁹⁶ See Section 5: Water Quality and Soils.

Given the fact that triclopyr has the potential to reach shallow groundwater in soils, the District must address this characteristic and consider the potential for contamination in karst terrain. As discussed in Section 4.F: Karst, Bland, Giles, Wythe, and Pulaski Counties all contain significant karst terrain and according to Virginia Department of Mines, Minerals, and Energy, “[g]roundwater contamination is a common problem” in karst terrain in Virginia, including herbicides.¹⁹⁷ Yet, the District has entirely failed to consider impacts from ~800 acres of herbicide in the project area, including in Management Prescription 9A1.¹⁹⁸ The District must consider these impacts and the contamination risk posed by extensive herbicide use.

Additionally, there is significant concern in Virginia about the vulnerability of karst aquifers to contamination in counties along the I-81 corridor due to the hazardous materials regularly transported along, and accidents on, I-81.¹⁹⁹ These counties include those in the project area. The District must consider the cumulative impact of further increasing this already high risk of contamination to groundwater in the project area. And to the extent the District does not yet know how many acres will actually receive herbicide treatments, it must analyze for the full 883 acres to adequately inform the public of maximum potential project impacts.²⁰⁰

Finally, the District entirely excluded the Dismal Creek area from its herbicide analysis. At the start of the Water Resources Report, the District notes that a separate analysis was performed for the proposed Dismal Area units and thus further analysis for the Dismal Area is not included in the report. But the separate analysis for the Dismal Area was a sedimentation analysis only; it does not discuss the impact of herbicide in the Dismal Area, despite the fact that herbicide use is proposed in all but two units in the Dismal Area. The upshot of this is that the District has failed to conduct an herbicide analysis for roughly half of the project. The District must consider the impacts of herbicide use in this area.

E. Non-Native Invasive Species

Related to the limited discussion of herbicides in the Draft EA, is the lack of detail regarding NNIS. The Draft EA merely acknowledges that stands in the project area currently have pockets of NNIS, that logging could exacerbate the problem, and then commits to treat *some* areas with herbicides after logging. The District must include a more meaningful analysis of NNIS in the project area.²⁰¹ This analysis should include discussion of project impacts on the spread of NNIS, current conditions within the project area, design criteria to minimize or reduce these impacts, as well as subsequent monitoring for new NNIS infestations and of NNIS

¹⁹⁷ Va. Dep’t of Mines, Minerals, and Energy, Division of Geology and Mineral Resources, Sinkholes and Karst Terrain, <https://www.dmme.virginia.gov/dgmr/sinkholes.shtml>.

¹⁹⁸ Draft EA 6.

¹⁹⁹ Va. Dep’t of Mines, Minerals, and Energy, Division of Geology and Mineral Resources, Sinkholes and Karst Terrain, <https://www.dmme.virginia.gov/dgmr/sinkholes.shtml>.

²⁰⁰ See WildEarth Guardians v. Conner, 920 F.3d 1245 (10th Cir. 2019) (Forest Service could account for the uncertainty about treatment locations by evaluating the project’s effects on lynx in a worst-case scenario in which all the mapped lynx habitat in the project area was treated).

²⁰¹ See FSM 2904.08 (The District Ranger is responsible for “[d]etermin[ing] the risk of invasive species introduction or spread as part of the project planning and analysis process for proposed actions, especially for ground disturbing and site altering activities, and public use activities.”).

treatment conducted in the project area.

NNIS are considered to be one of the four most critical threats to Forest Service-managed lands.²⁰² Federal agencies have clear directives regarding NNIS, including the following:

...refrain from authorizing, funding, or implementing actions that are likely to cause or promote the introduction, establishment, or spread of invasive species in the United States unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.

Sec. 2(a)(3) Executive Order 13112 (Safeguarding the Nation from the Impacts of Invasive Species (amended December 5, 2016)). The Jefferson Plan provides the following goal: “Goal 14: Management activities will reduce the impacts from non-native invasive species.” Plan at 2-25.

Project-level details and analyses are required to develop an adequate treatment plan for NNIS, which should include the following:²⁰³

- Inventory/Mapping of NNIS in the Project Area and adjacent areas
- Species-specific review
- Risk assessment
- Cost/benefit analysis
- Initial treatment plan
- Mitigation plan

Planning for NNIS identification and treatment is based on site-specific complexities, which must be analyzed during project development and NEPA review.²⁰⁴ Without this detailed analysis, the District cannot support a finding of no significant impact. In light of the severity of the risks associated with NNIS, the District must fully and adequately analyze NNIS to make a valid determination regarding the NNIS associated risks. As part its analysis, the District should also disclose and evaluate the success of previous pre- and post-logging NNIS treatment on the Jefferson National Forest, the likelihood that NNIS treatments will be effective here, the back-up plans if initial efforts are not effective, and a realistic assessment of the risk the project will increase NNIS here. The District should commit not only to post-harvest treatment, but also

²⁰² See George Washington and Jefferson National Forests, Forest-Wide Non-Native Invasive Plant Control Environmental Assessment (“NNIS EA”) (2010)

²⁰³ See James H. Miller, Steven T. Manning, and Stephen F. Enloe, United States Department of Agriculture, Forest Service, Southern Research Station General Technical Report SRS- 131: A Management Guide for Invasive Plants in Southern Forests (2015).

²⁰⁴ See California v. Block, 690 F.2d 753, 763-65 (9th Cir. 1982) (EIS inadequate for failure to conduct site-specific analysis of each individual roadless area, such as describing each area’s distinguishing characteristics and attributes and evaluating the impact of development on those values); Nat. Res. Def. Council, 388 F. Supp. at 838-41; National Audubon Soc’y, 422 F.3d at 187-189.

to pre-harvest surveys and treatment in order to better reduce and avoid the spread of NNIS.

Committing to assessment/monitoring and treating NNIS is critical to preventing the spread of NNIS. Accordingly, we recommend adding language similar to that used in the Lower Cowpasture project:

The Forest Service will assess the need to treat non-native invasive plants (NNIP) within regeneration harvest units in conjunction with site preparation work, which typically occurs in the first or second growing season after final harvest, and in conjunction with regeneration surveys that typically occur in the third growing season after final harvest. The Forest Service will assess the need to treat non-regeneration harvest units based on the degree of infestation occurring in the sale area. The Forest Service will then treat areas that are determined to need treatment on a case-by-case basis, depending on the severity of NNIP infestations.²⁰⁵

It is important that the District is in fact able to follow through with these commitments. Because mitigating the spread of NNIS as a result of ground disturbance in the project area requires intensive management efforts for the long term, the District must ensure it has adequate funding to implement this mitigation. In order to address this concern, we request the District estimate costs of plan implementation and assess the short and long-term security of funding sources. This should be part of the disclosed analysis.

Finally, if the District ultimately determines that NNIS control/eradication is unlikely to succeed in a specific area, we urge the District not to move forward with logging in the area until those threats can be addressed adequately.

6. Dismal Creek issues

The Draft EA inadequately analyzes impacts within the Dismal Creek area. The Dismal Creek area contains many important resources that the District needs to consider.

A. Wilderness characteristics

The District must analyze the effects that timber harvest within the Dismal working area will have on the area's future potential for wilderness or inventoried roadless area (IRA) designation. During plan revision, the Forest Service declined to add Dismal Creek to the roadless inventory based in part on an arbitrary road-density analysis.²⁰⁶ However, the fact that

²⁰⁵ See Decision Notice and Finding of No Significant Impact for the Lower Cowpasture Restoration and Management Project 8.

²⁰⁶ See Process Paper, Roadless Inventory Areas Considered for Inclusion (Aug. 5, 1997); In re Appeal of the Jefferson National Forest Revised Land and Resource Management Plan, at 27 & Detailed SELC Analysis of Roadless Inventory attached thereto, at 3-4 (April 28, 2004) ("This area not only has a 2,818-acre semi-primitive core, but also harbors eleven miles of the Appalachian Trail and the upper watershed of Dismal Creek from ridge top to ridge top. The agency disqualified it because of a road density of .63 miles per thousand acres, but in doing so rejected repeated proposals that would have drawn out improved roads to reduce the road

this area is uninventoried does not excuse the District from its obligation to evaluate impacts to the wilderness character of the area from allowing logging and skid trails within the area. Before deciding to proceed with timber harvest within an area that possesses the characteristics that qualified it for inventory, the agency must evaluate the impacts of such a decision on those characteristics.²⁰⁷

The Dismal Creek Area meets criteria for designation as an IRA. The area contains a 2,818-acre semi-primitive core, portions of the Appalachian Trail, the entire headwaters of the upper Dismal Creek from ridge top to ridge top, and provides opportunity for solitude and unconfined recreation. But, the area was arbitrarily omitted from inventory because the Forest Service refused to adjust the area boundaries to exclude portions of FS 1015, despite the regional forester claiming the “the location of the boundary” alone would not “cause[] an area to fall out of the inventory.”²⁰⁸ The existing public road density in the Dismal Creek area has not changed significantly since the area was proposed for inventoried roadless status during plan revision.²⁰⁹ If the District takes the position that this area no longer possess the attributes of an uninventoried roadless area, the District must evaluate the cumulative impacts of the proposed action in conjunction with whatever actions contributed to the change in character.

The Dismal Creek area also meets the criteria for designation as a potential wilderness area (PWA) because, among other relevant attributes, it offers outstanding opportunities for solitude; is untrammeled; and contains rare communities, water resources containing the endangered candy darter, and outstanding landscape features.²¹⁰ Because the area meets the criteria for a PWA, the District should not degrade the area before considering it for PWA in the next plan revision. If the District does move forward with timber harvest in the Dismal Creek working area, the potential significance of disturbance activities associated with timber harvest in the area requires an EIS. Attributes that qualify an area as potential wilderness “possess independent environmental significance.”²¹¹ In addition, the potential for designation as a

density well below .5.”); see also George Washington and Jefferson National Forests Motor Vehicle Use Map 2015, at Map 40 (showing the existing road density within the Dismal Creek area).

²⁰⁷ See, e.g., Lands Council v. Martin, 529 F.3d 1219, 1230 (9th Cir. 2008) (discussing NEPA obligations that extend to the attributes of uninventoried roadless areas); Sierra Club v. Austin, 82 F. App'x 570, 573 (9th Cir. 2003) (finding error where the Forest Service failed to address the effects of logging in unroaded areas on their characteristics vis-a-vis potential for future wilderness or IRA designation); Cascadia Wildlands v. Carlton, 2017 WL 1807607, at *10 (D. Ore. Mar. 20, 2017) (finding deficient the EA's analysis of “timber sale's effects to Wilderness, Potential Wilderness, and other undeveloped areas”); see also Ore. Nat. Desert Ass'n v. Bureau of Land Mgmt., 625 F.3d 1092 (9th Cir. 2010) (concluding that BLM violated NEPA by declining to study wilderness characteristics because “[w]ilderness values are among the resources which the BLM can manage”).

²⁰⁸ Attached Detailed SELC Analysis of Roadless Inventory at 3-4 (attachment to 2004 Appeal of the Jefferson Forest Plan).

²⁰⁹ See George Washington and Jefferson National Forests Motor Vehicle Use Map 2015, at Map 40 (showing the existing public roads within the Dismal Creek area).

²¹⁰ See FSH 1909.12 Chapter 70

²¹¹ Lands Council, 529 F.3d at 1230 (EIS that provided a “three-page analysis on roadless

wilderness area is an independent factor of significance.²¹² And impacts that would make an area ineligible for inventory in the future are likely to be “significant,” requiring full consideration in an EIS.²¹³

B. Endangered candy darter

As the District knows, Dismal Creek contains the endangered candy darter and proposed critical habitat for the candy darter.²¹⁴ The candy darter and its proposed critical habitat require robust analysis and special consideration. Based on the limited information in the Draft EA, however, it appears the District has not adequately considered the potential negative impacts of the proposed management.

i. **Tiering to Conservation Plan**

The Draft EA does not adequately address the potential impacts to the candy darter and its proposed critical habitat, even setting aside the problems that arise from withholding the BE/BA during the public comment period.²¹⁵ Dismal Creek contains proposed critical habitat for the candy darter in part because the population “contributes to the representation and redundancy of the species.”²¹⁶ However, the Draft EA does not adequately explain its conclusion regarding the potential impacts from the project on the candy darter’s proposed critical habitat. The Draft EA states that the project is not likely to adversely affect the candy darter, but goes on to conclude that the project will have “[n]o effect” on the candy darter’s proposed critical habitat.²¹⁷ This effects determination is not logical. If the project will affect the candy darter (even if not adversely), it will also affect the habitat in which the candy darter lives (even if not adversely).

The Draft EA states that the project “will be in compliance with the George Washington and Jefferson National Forest Federal Listed Threatened and Endangered Mussel and Fish Conservation Plan” (Conservation Plan).²¹⁸ Did the District rely on any other guidance to reach its determination that the project is not likely to adversely affect the candy darter? It is not sufficient for the agency to rely on the Conservation Plan because the Conservation Plan was published in 2004 – 14 years before the candy darter was listed as endangered – and necessarily

character” was “cursory” and therefore insufficient”); Cascadia Wildlands, 2017 WL 1807607, at *10 (timber sale’s effects to wilderness, potential wilderness, and other undeveloped areas necessitated an EIS).

²¹² Smith v. U.S. Forest Serv., 33 F.3d 1072, 1078–79 (9th Cir. 1994).

²¹³ See 36 C.F.R. § 220.5(a)(2) (“Proposals that would substantially alter the undeveloped character of an inventoried roadless area or a potential wilderness area” will ordinarily require an EIS.).

²¹⁴ Draft EA 24; Dismal Creek Sediment Analysis at 1; Aquatic Organisms Report at 1; see also Endangered and Threatened Wildlife and Plants: Designation of Critical Habitat for the Candy Darter, 83 Fed. Reg. 59232, 59238 (Nov. 21, 2018).

²¹⁵ See Section 5.B: Threatened, Endangered, and Sensitive Species.

²¹⁶ 83 Fed. Reg. at 59238.

²¹⁷ Draft EA 24.

²¹⁸ Id.

does not account for the candy darter specifically.²¹⁹ Likewise, the Conservation Plan does not consider whether specific conservation measures are necessary for threatened and endangered fish species in the New River drainage; when the Conservation Plan was published, it accounted only for fish species in the upper Tennessee, Cumberland, and Roanoke drainages.²²⁰ The requisite conservation measures may be similar or identical for fish species in the New River drainage, but the District cannot reach that conclusion without analysis. Finally, the Conservation Plan does not account for increased water temperature as a threat to endangered fish species, but increased water temperature is a threat to the candy darter.²²¹ The Draft EA cannot simply tier to the Conservation Plan without additional analysis about the potential impacts of water temperature increases from the project.²²²

ii. Complying with Conservation Plan

The requirements of the Conservation Plan apply to 6th level watersheds.²²³ The 6th level watershed that contains Dismal Creek and its tributaries is Kimberling Creek–Dismal Creek (HUC No. 050500020105).²²⁴ This watershed includes all units within the Dismal working area except units 1, 2, 4, and 5. It appears that part of unit 3 extends into the watershed, although most of unit 3 appears to drain into Ding Branch and Nobusiness Creek. The Conservation Plan requires the District to establish and manage a Conservation Zone in the Kimberling Creek–Dismal Creek watershed that includes the riparian corridor and channeled ephemeral zone at a minimum.²²⁵ Has the District identified the Conservation Zone within the watershed?

The Conservation Plan must identify goals, objectives, and standards that apply to the Kimberling Creek–Dismal Creek watershed in light of the candy darter. Objective 1.01 is that the Forest Service will “[m]aintain or restore temperature, balance of water and sediment, chemical resilience, and biological integrity.”²²⁶ Likewise, Objective 3.01 states that “[s]reams are managed in a manner that results in sedimentation rates that stabilize or improve the biological condition category of the stream as monitored using aquatic macroinvertebrates.”²²⁷ The Dismal Creek Sediment Analysis concedes that the project will result in 4.99 tons of

²¹⁹ See Motor Vehicle Mfrs. Ass’n of U.S., 463 U.S. at 43 (an agency action is arbitrary and capricious when the agency “entirely failed to consider an important aspect of the problem”).

²²⁰ Conservation Plan 5.

²²¹ Compare Conservation Plan 7-8 (listing introduced species, impoundments, stream channelization, sedimentation, physical damage, and pollutants as threats to endangered fish species) with USFWS Candy Darter Recovery Outline at 6 (recommending that existing candy darter populations be protected in part by “avoiding and minimizing . . . increases in water temperatures”).

²²² See Motor Vehicle Mfrs. Ass’n of U.S., 463 U.S. at 43.

²²³ See Conservation Plan at 13.

²²⁴ See Aquatic Organisms Report at 1; see also Virginia Hydrologic Unit Explorer, Virginia Department of Conservation and Recreation, available at <http://consapps.dcr.virginia.gov/htdocs/maps/HUExplorer.htm>.

²²⁵ Conservation Plan 10.

²²⁶ Id. at 13.

²²⁷ Id. at 14.

sediment per year entering Dismal Creek if all the proposed management activities occur in one year—a 2.26% increase over the background sediment level.²²⁸ The District must explain how this projected sedimentation will “maintain or restore [the] balance of water and sediment” and “stabilize or improve” the condition of Dismal Creek. In addition, because the Conservation Plan applies to the entire 6th level watershed, the District must explain how the Conservation Plan’s objectives will be satisfied with respect to sedimentation in tributaries like Standrock Branch and Pearis Thompson Branch. Similarly, Objective 1.01 states that the Forest Service will maintain or restore the temperature of streams within the watershed.²²⁹ However, the EA acknowledges that the project will result in increased sunlight reaching the forest floor.²³⁰ Has the District analyzed the impact on water temperature in the project area from warmwater runoff?

Finally, the District must commit to implementation monitoring throughout the watershed as required by the Conservation Plan.²³¹ The District must also coordinate with the Virginia Department of Game and Inland Fisheries to monitor the candy darter.²³²

iii. Candy darter impacts

The proposed action is not compatible with the needs of the candy darter or its proposed critical habitat. Sedimentation from timber harvest and associated ground disturbance in the Dismal Creek watershed is a significant threat to the candy darter because “[c]andy darters are intolerant of excessive sedimentation and stream bottom embeddedness (the degree to which gravel, cobble, rocks, and boulders are surrounded by, or covered with, fine sediment particles).”²³³ Temperature increases from warmwater runoff due to diminished forest cover is also a concern.²³⁴

Critically, the District cannot simply rely on BMPs to protect the candy darter.²³⁵ The Aquatic Organism Report and the Dismal Creek Sediment Analysis both claim that application of BMPs will minimize sedimentation, and both rely on BMPs to predict or model impacts.²³⁶ But BMPs are not sufficient to protect the candy darter. When USFWS listed the candy darter as endangered, it found that BMPs did not ameliorate the risk of extinction:

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the candy darter. Our analysis of this information indicates that . . . [e]xcessive sedimentation and increased water temperatures degraded once-suitable habitat . . . and likely caused historical declines of the candy darter. We also analyzed existing regulatory mechanisms (such as . . . the increased implementation of forestry and

²²⁸ Dismal Creek Sediment Analysis 2.

²²⁹ Conservation Plan 13.

²³⁰ See Draft EA 18.

²³¹ See Conservation Plan 23.

²³² See id. at 23.

²³³ USFWS Candy Darter Recovery Outline 2.

²³⁴ USFWS Candy Darter Recovery Outline 7.

²³⁵ See Sedimentation analysis above.

²³⁶ See Aquatic Organisms Report 6; Dismal Creek Sediment Analysis 1.

construction “best management practices” designed to reduce erosion and sedimentation) . . . to reduce or eliminate sedimentation and found that these mechanisms were not sufficient to protect the species from extinction as excessive sedimentation and increased water temperatures continue to affect some of the remaining populations.²³⁷

The USFWS Candy Darter Recovery Outline specifically recognizes that ordinary BMPs are not sufficient because it recommends “utilizing enhanced best management practices . . . designed to reduce sedimentation, erosion, and bankside destruction when implementing construction and forestry projects.”²³⁸

The District must consider whether the Dismal Creek watershed can accommodate hundreds of acres of regeneration harvest given the foreseeable impacts on the candy darter and its proposed critical habitat. Units 6–18 and part of unit 3 all drain into Dismal Creek within, or upstream of, proposed candy darter critical habitat. We are particularly concerned about units 6, 16, 17, and especially 18 given their close proximity to Standrock Branch. The confluence of Standrock Branch and Dismal Creek marks the upstream boundary of the proposed candy darter critical habitat in Dismal Creek, so the location of these units could amplify the effects of an already intensive silvicultural method in this watershed.²³⁹

At a minimum, we strongly urge the District to adopt design criteria for the units in the Dismal Creek watershed that are consistent with the USFWS Candy Darter Recovery Outline. The Recovery Outline recommends several measures that the District should implement here: (1) “protecting existing forested riparian areas”; (2) “utilizing enhanced best management practices . . . designed to reduce sedimentation, erosion, and bankside destruction when implementing construction and forestry projects”; (3) “protecting riparian corridors and retaining sufficient canopy cover along banks”; and (4) “maintaining or restoring forest cover within candy darter watersheds to protect water temperatures and warmwater runoff.”²⁴⁰ For example, the District should consider implementing design criteria for a riparian buffer area like those below, which were used recently on another project in an impaired watershed on the Jefferson National Forest.

Riparian buffers. The following measures apply in all riparian corridors throughout the Dismal Creek watershed. These measures are designed to reduce sedimentation; in no case shall riparian buffers or standards for management within them be less restrictive or less protective of water quality than those provided in the Forest Plan.

A. Riparian buffer with the following minimum widths on each side:

- i. **Perennial streams, lakes, ponds, wetlands, springs, or seeps, regardless of slope class**
 - a. 100-foot Core buffer; and

²³⁷ Endangered and Threatened Wildlife and Plants: Endangered Species Status for the Candy Darter, 83 Fed. Reg. 58747, 58751 (Nov. 21, 2018) (emphasis added).

²³⁸ USFWS Candy Darter Recovery Outline 6.

²³⁹ See 83 Fed. Reg. at 59238.

²⁴⁰ USFWS Candy Darter Recovery Outline 6–7 (emphasis added).

b. 50-foot Extended buffer.

ii. **Intermittent streams, regardless of slope class:**

- a. 50-foot Core buffer; and
- b. 50-foot Extended buffer.

iii. **Channeled Ephemeral Zones:**

- a. 50 feet on each side of channeled ephemeral streams; and
- b. 50 feet upstream of the point at which the scoured channel begins (“nick point”).

B. Management within riparian buffers:

- i. In Core buffers, timber harvest, tree cutting, tree removal, and ground disturbance are prohibited.
- ii. In Extended buffers and Channeled Ephemeral Zones, ground disturbance is prohibited. As such, any logging and/or tree removal otherwise allowed by the Forest Plan must use full-suspension cable logging; winching logs out of these Extended buffers is prohibited.
- iii. To the maximum extent possible, the Forest Service will plan and lay out project activities to minimize crossing perennial, intermittent, and channeled ephemeral streams and lakes, ponds, wetlands, springs or seeps.

Aside from the above, all relevant Forest Plan standards related to riparian corridors, channeled ephemeral zones, and protecting water quality apply to the project area. These design criteria would allow the District to achieve the purpose and need of the project while remaining consistent with the USFWS Candy Darter Recovery Outline.

C. Biological resources

The Draft EA does not acknowledge that the Dismal working area overlaps with special biological resources and thus fails to evaluate the impacts on those resources. The District must evaluate the impacts of the proposed action on Dismal Creek’s rare communities and ensure they are adequately protected. During scoping, the Virginia Department of Conservation and Recreation commented that Dismal Creek is “one of the finest botanical sites in Virginia.”²⁴¹ Dismal Creek is also recognized as a Virginia Mountain Treasure that is “home to several rare calciphytic (calcium-loving) plants. The unusual northern white-cedar also grows in the drainage.”²⁴²

The Forest Plan recognizes the biological value of the Dismal Creek watershed by

²⁴¹ DCR Scoping Comment 3.

²⁴² The Wilderness Society, Virginia’s Mountain Treasures: The Unprotected Wildlands of the Jefferson National Forest 47 (1999).

designated over 600 acres as management prescription 9F – Rare Communities.²⁴³ The area contains two types of rare mountain wetland communities. The first is a Montane Basic Seepage Swamp that is “rare on the Forest.”²⁴⁴ The second is Central Appalachian calcerous shrub fen/seep, and the area includes three discrete occurrences of this rare community.²⁴⁵ The Forest Plan notes that “[c]alcerous fens are extremely rare on the Forest and are high priorities for conservation.”²⁴⁶ Exotic weeds are a threat to rare mountain wetlands. The Dismal Creek area also contains rare Basic Mesic Forest.²⁴⁷ Across the Forest, “[t]he extent and viability of basic mesic forests has been reduced by repeated logging and invasive exotic weeds.”²⁴⁸ Finally, the Dismal Creek area contains the rare Southern Appalachian northern white-cedar slopeforest.²⁴⁹ “This is a rare natural community occurring in small, isolated patches from the Ridge and Valley province of western Virginia south to the Eastern Highland Rim, Ridge and Valley, and low Blue Ridge regions of Tennessee.”²⁵⁰

Although the project units do not appear to overlap the 9F–Rare Communities management prescription, the District must evaluate whether these communities will be impacted and take care to ensure that they are not. Both the Forest Plan and the Conservation Plan prohibit “[m]anagement actions [in the riparian corridor] that may negatively alter the hydrologic conditions of wetland rare communities.”²⁵¹ Has the District analyzed whether the project will have any effect on the rare wetland communities in the Dismal working area? Unit 18 is especially concerning because it directly abuts the 9F – Rare Communities management prescription. Similarly, the Forest Plan recognizes that Basic Mesic Forest and Central Appalachian calcerous shrub fen/seep communities are threatened by exotic weeds.²⁵² From the maps accompanying the Draft EA, it appears that Road 201, which passes through the 9F – Rare Communities management prescriptions in the watershed, will be used to reach most of the units in the Dismal working area. Given the threats that exotic weeds pose to rare communities in the working area and the known correlation between NNIS, ground disturbing activities, and travel corridors, the District must take extra care to ensure that NNIS infestations do not occur.²⁵³

Finally, we note the presence of two rare plants that the Draft EA does not mention even though the District was on notice of their presence. During scoping, Virginia DCR identified the presence of two plant species in the Dismal Creek watershed that are rare both globally and in Virginia: Bog bluegrass and Torrey’s mountain-mint.²⁵⁴ Did the District assess whether the

²⁴³ Forest Plan C-2.

²⁴⁴ *Id.* at C-10.

²⁴⁵ *Id.* at C-9.

²⁴⁶ *Id.*

²⁴⁷ *Id.* at C-2.

²⁴⁸ *Id.* at C-18.

²⁴⁹ *Id.* at C-20.

²⁵⁰ *Id.*

²⁵¹ *Id.* at 3-183; Conservation Plan 15 (Standard 11-013).

²⁵² Forest Plan at C-9, C-18.

²⁵³ See Environmental Assessment for Forest-Wide Non-Native Invasive Plant Control, George Washington and Jefferson National Forests at 10.

²⁵⁴ DCR Scoping Comments 3.

project would impact these species?

D. Recreation

The Draft EA does not acknowledge recreational resources in the Dismal area, and so does not evaluate impacts on those resources. NEPA requires more.

The Draft EA offers no analysis on dispersed recreation and trails anywhere in the project area, including in the Dismal working area.²⁵⁵ However, this omission is especially glaring in the Dismal working area. At a bare minimum, the District cannot ignore the effects of the proposed action on dispersed recreation and trails while simultaneously proposing three units of regeneration harvest in management prescription 7E2 – Dispersed Recreation Areas.²⁵⁶

The Dismal working area contains recreational and scenic resources that the District must evaluate and protect. For example, the Appalachian Trail passes through the Dismal working area; the trail travels along the valley floor downhill from most of the units in the watershed, then climbs Sugar Run Mountain and traverses west above units 7–15. Has the District evaluated whether impacts to the Appalachian Trail viewshed will comply with the Forest Plan’s standards to protect scenic resources. The units proposed for harvest in the Dismal working area are within management prescriptions 8A1 and 7E2, and both management prescriptions have scenic standards with which the District must ensure compliance.²⁵⁷ In the case of units with management prescription 7E2, the Forest Plan also provides that timber harvest must be “compatible with the recreational and aesthetic values of these lands.”²⁵⁸ Moreover, “[t]imber harvesting operations focus on what is retained in the forest, not on wood fiber production. Timber harvest is carefully timed and designed to be subtle.”²⁵⁹ Regeneration harvest is hardly subtle.

The District should also consider the practical impacts of this project on recreation in the Dismal working area. From our GIS analysis, it appears that several units overlap existing trails; for example, unit 16 sits directly atop the Hoof and Hill Horse Trail. The FSTopo basemap covering Dismal Creek also indicates a network of trails at the head of the drainage that units 13–15 will overlap. The District should evaluate how the proposed action will affect trails within the project area, especially those trails that are covered by units proposed for harvest. In our experience, timber harvest and canopy opening along trails leads to brushy conditions that can make trails impassable if not cleared. Does the District propose to maintain affected trails after harvest?

The District must also specifically consider impacts to equestrian recreation in the Dismal working area. In addition to Little Horse Equestrian Trail, other equestrian trails in the Dismal working area include the Pearis Thompson, Standrock Branch, Hoof & Hill, Deetz, and Rooster Equestrian Trails. How was the District able to conclude there would be no direct or indirect impacts to the equestrian trails system in the Dismal area? What will the impact be on

²⁵⁵ Draft EA 8.

²⁵⁶ Compare Draft EA 5 with Draft EA 8.

²⁵⁷ See Forest Plan 3-102 to 3-105, 3-116.

²⁵⁸ Forest Plan 3-102.

²⁵⁹ Forest Plan 3-104.

access and use of these trails during project implementation? Once these trails are opened up, it is difficult to keep them clear. For example, management in the Mt. Rogers area opened up numerous trails with modified Shelterwood treatment and resulted in numerous briars along the trails, making it impossible to walk from campgrounds to the Mt. Rogers Trail. What is the District's plan for maintaining the numerous trails in the Dismal Creek area to ensure they do not become overgrown with briars and in turn unusable? The Service must provide evidence to support its conclusions of no significant impact on these resources.

Additionally, if the Service intends to use these trails as roads in the project area, they must consider the impacts on recreation associated with constructing, upgrading, and using these trails to access logging units. Specifically, the District should consider the type of gravel it uses. Based on a recent conversation with an equestrian in the area, we came to understand that, in other locations on the JNF, the use of large, sharp gravel has made it difficult to riders to use the trail and requires special equipment to protect horse hooves. The Service should commit to using gravel that will avoid these impacts. This is a good example of why recreation impacts must be analyzed and disclosed for public consideration in the EA. And what is the Service's plan for maintaining the trails during and after timber harvest to ensure equestrian rides are still able to use the trail? As mentioned previously, opening the canopy along these trails may result in brushy conditions that would make these trails unusable for riders. The District must also consider the impact of felled trees that block access to these trails.

E. Forest Plan compliance

The District must ensure that the proposed action will comply with all aspects of the Forest Plan. We note several issues the District should consider.

First, the Draft EA states that some timber harvest may occur in the extended riparian corridor.²⁶⁰ As discussed above, we urge the District to adopt an enhanced riparian buffer to protect the candy darter, consistent with the recommendations of the USFWS Candy Darter Recovery Outline. In addition to that request, we note that the Forest Plan allows timber harvest in the extended riparian corridor only when the adjacent management prescription is suitable for timber harvest.²⁶¹ As discussed above, in the case of units proposed for harvest in management prescription 7E2, timber harvest must be "compatible with the recreational and aesthetic values of these lands."²⁶² Therefore, even though the management prescription is suitable for timber harvest in general, regeneration harvest in management prescription 7E2 – and by extension in extended riparian corridors embedded within 7E2 areas – is not compatible with the Forest Plan. In addition, the Forest Plan prohibits vehicles from entering the extended riparian corridor.²⁶³

Second, the Draft EA states that harvest in units designated for shelterwood with reserves will leave a residual basal area of 15 to 25 square feet per acre.²⁶⁴ For any harvest that will occur in a channeled ephemeral zone, no more than 50% of the basal area may be removed,

²⁶⁰ Draft EA 8.

²⁶¹ Forest Plan 3-183 to 3-184.

²⁶² Id. at 3-102.

²⁶³ Id. at 3-18.

²⁶⁴ Draft EA 14.

and a minimum basal area of 50 square feet per acre must remain after management.²⁶⁵ Although this requirement applies across the Forest, it is especially important in the Dismal Creek watershed given the presence of the candy darter. The Conservation Plan notes that the Conservation Zone, which includes the riparian corridor and the channeled ephemeral zone, “will serve as a 1) filter strip to impede surface runoff, trap sediment, and filter and adsorb [*sic*] pollutants, 2) vehicle exclusion zone to prevent major ground disturbance adjacent to stream channels, and 3) shade strip to help maintain ambient stream water temperatures, moist habitats, and sources for large woody debris.”²⁶⁶

7. Cumulative Impacts

Under NEPA, an environmental assessment must discuss all direct, indirect and cumulative impacts of a proposed project.²⁶⁷ A “cumulative impact” is defined as an impact that “results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions.”²⁶⁸ A cumulative impact may result from “individually minor but collectively significant actions taking place over a period of time.” *Id.*

In taking cumulative impacts into account, the District must “give a sufficiently detailed catalogue of past, present, and future projects, and provide adequate analysis about how these projects, and differences between the projects, are thought to have impacted the environment.”²⁶⁹ “For the public and agency personnel to adequately evaluate the cumulative effects of past timber harvests,” this catalogue must provide “adequate data of the time, type, place, and scale of past timber harvests and should . . . explain[] in sufficient detail how different project plans and harvest methods affected the environment.”²⁷⁰

The District has already proposed a significant amount of management in this area for the next ten years. Did the District consider all of the Phase I activities or just the units that are sold/completed? Only considering sold/completed timber sales would fail to consider all *reasonably foreseeable* future impacts to the area, i.e. the remainder of Phase I that the District intends to implement. And has the District considered the prescribed burn at all? The Draft EA indicates it has not. And the map showing the overlap between the three projects (attached) highlights why a cumulative impacts analysis should take into account Phase I and the prescribed burn. For example, the three projects have the same footprint in many working areas and so will impact many of the same watersheds and other resources. The Dismal Creek working area and the No Business working area from Phase I are in the same area and units 1-4 on the Dismal Area flow into No Business Creek, and both Dismal Creek and No Business Creek flow into Kimberling Creek. Has the District considered the cumulative impacts on water quality in No Business and Kimberling Creeks of multiple high-intensity timber harvests

²⁶⁵ Forest Plan 2-8; see also Conservation Plan 21.

²⁶⁶ Conservation Plan 10.

²⁶⁷ 40 C.F.R. § 1508.9(b); § 1508.25(c).

²⁶⁸ 40 C.F.R. § 1508.7.

²⁶⁹ Te-Moak Tribe of W. Shoshone of Nev. v. U.S. Dep’t of Interior, 608 F.3d 592, 603 (9th Cir. 2010).

²⁷⁰ Lands Council v. U.S. Forest Serv., 395 F.3d 1019, 1028 (9th Cir. 2004).

in this area? The District's failure to conduct a cumulative impact analysis that factors in the impacts of Phase I and the prescribed burn is particularly concerning because both projects were done under CEs and so did not include *any* cumulative impacts analysis. The District must conduct this necessary analysis here.

Additionally, the District's statement of the difficult nature of predicting activities on nearby private lands is unacceptable.²⁷¹ NEPA does not allow the District to simply throw up its hands and say it is too difficult to gauge activity on private land. But at the same time, the District claims in its Aquatic Organisms Report that "[a]ctivity on private land within these watersheds are expected to remain the same as current for the next 10 years."²⁷² How can the District support a claim that activity on private land will remain the same for the next decade, while also claiming it is too difficult to gauge future activity on private land? The District cannot have it both ways. At a minimum, the District could have reached out to lumber mills and loggers to try to gauge possible activity levels anticipated.

8. Mitigation

An agency may not escape the obligation to analyze site-specific environmental consequences of the action by relying on general mitigation measures, without the requisite analysis determining the efficacy of those measures at the site-level.²⁷³ Issues with the District's analysis of mitigation measures are discussed throughout these comments. Here, we focus on several issues that would most clearly benefit from a more robust assessment of effectiveness.

As discussed previously, the District cannot simply rely on BMPs to claim there will be no significant impacts from erosion and sedimentation in the project area. The Fourth Circuit Court of Appeals recently held the Forest Service's reliance on an "overly high efficiency rate of erosion control devices" of 96 percent in the George Washington National Forest was an error in its NEPA analysis. "The problem... was assuming that these devices would function nearly perfectly to reduce erosion and sediment, despite a wealth of evidence to the contrary."²⁷⁴ The District makes the same mistake here by relying on BMPs, despite a wealth of information suggesting BMPs are inadequate to prevent erosion and sedimentation impacts.

Section 5.A: Water Quality and Soils noted that certain Forest Plan objectives are based on slope and soil characteristic, such as "[u]se of advance harvest systems on sustained slopes over 20 percent."²⁷⁵ In addition to considering the soil types and slopes in the project area, the District should also commit to clarify the meaning of "sustained slopes." For example, the Decision Notice for the Lower Cowpasture Restoration and Management clarified that

²⁷¹ Draft EA 26; Wildlife Habitat and Successional Forests Report 4, 5, 6, 8; Aquatic Organisms Report 5.

²⁷² Aquatic Organisms Report 5.

²⁷³ See Colorado Env'tl. Coal. v. Dombeck, 185 F.3d 1162, 1173 (10th Cir. 1999) ("merely list[ing] possible mitigation measures" is insufficient); Neighbors of Cuddy Mountain, 137 F.3d at 1381 (disapproving an EIS that lacked such an assessment); see also Ohio Valley Env'tl. Coal. v. Hurst, 604 F. Supp. 2d 860, 889 (S.D.W. Va. 2009) (a "perfunctory description" or "mere listing" of mitigation measures without supporting analysis insufficient to support a FONSI).

²⁷⁴ Cowpasture River Pres. Ass'n, 911 F.3d at 177 (emphasis added)

²⁷⁵ See e.g., Forest Plan 2-33 (FW-111).

sustained distances were those of approximately 300 feet in length.²⁷⁶ The Clinch District similarly committed to a distance of approximately 300 feet in length in resolving objections to the Nettle Patch Project.²⁷⁷ The Eastern Divide District should do the same with this project (or at least explain how it will define “sustained slopes” as used in FW-111).

9. Monitoring and Adaptive Management

It is essential that the District describe and commit to a detailed monitoring plan for the proposed project, particularly given the large scale of this project and the long timeframe for implementing it. Unfortunately, the Draft EA includes only two sentences saying nothing more than “[m]onitoring of the project actions will occur.”²⁷⁸ Robust monitoring has many important purposes, including to assess whether the stated desired conditions, goals, and objectives of a particular project are being met, verify assumptions about project results and impacts, and inform any adaptation that is needed during implementation.²⁷⁹

This is particularly important given the difficulty of regenerating oak. The District should commit to enhanced composition monitoring in order to better understand whether its proposed treatment is effectively regenerating oak in the project area or if changes and additions to the proposed management are necessary. And as with other critical components of a project, adequate monitoring plans should be developed during project development and analysis, and be available for public review. Simply stating that the District will monitor the project actions does not count as a full and adequate consideration of monitoring.

The Forest Plan provides the starting point for an effective monitoring and evaluation program.²⁸⁰ The Plan establishes Monitoring Questions, which direct what will be monitored at the project level, but do not address how monitoring will be accomplished. Determining the latter is left to the Districts implementing the Plan through projects. Accordingly, when implementing the Forest Plan, the District must refine the Monitoring Questions into Monitoring Elements and Task Sheets, which are detailed, specific, and measureable.²⁸¹

A Task Sheet will explain the task to be conducted and what goals, objectives, or Monitoring Questions are addressed by the task.²⁸² The Task Sheet also explains the method of data collection, what is being measured, the frequency of data collection, the reliability of the method and will assign responsibility for the task. The resulting monitoring and evaluation program addresses implementation of the Forest Plan, the effectiveness of the implementation, and validates data to determine if information used in developing the Forest Plan has

²⁷⁶ See Lower Cowpasture Decision Notice 8, available at http://a123.g.akamai.net/7/123/11558/abc123/forestservic.download.akamai.com/11558/www/nepa/95412_FSPLT3_2621155.pdf.

²⁷⁷ See Nettle Patch Decision Notice at 12, available at http://www.fs.usda.gov/nfs/11558/www/nepa/100475_FSPLT3_4629935.pdf.

²⁷⁸ Draft EA 7.

²⁷⁹ See Forest Plan at 5-3.

²⁸⁰ Id.; see also 36 C.F.R. § 219.12(k).

²⁸¹ See id.

²⁸² See Forest Plan at Appendix E.

changed.²⁸³

To properly implement the Plan and step down monitoring to the project level, the District should: (1) clearly define the reference conditions, the existing conditions and the desired conditions for the proposed treatments; (2) set specific, measurable objectives for treatments to achieve, including vegetation structure and composition; (3) commit to project-level monitoring that can and will measure whether and to what extent those objectives have been met; and (4) commit to evaluating the monitoring results, including considering the need to adjust later phases of this project and/or future projects.

The current cursory discussion of monitoring in the Draft EA does not do this. For example, stated objectives of this project include to regenerate oak and increase ESH in the project area. To accomplish these objectives, the agency proposes nearly 1,200 acres of regeneration harvest. But the monitoring “discussion” in the Draft EA falls far short of a monitoring plan to actually determine if the District achieves these stated objectives. And as discussed in Section 2.C: Oak Regeneration Science there is good reason to think oak regeneration will *not* follow the proposed silvicultural treatments in a number of project stands. The District needs to develop the Monitoring Elements and Task Sheets, as well as explain when it will survey and explain the specific quantifiable conditions the agency will assess during monitoring to assess oak regeneration.

The agency should also commit to monitoring forest vegetation structure and composition in the overstory, midstory, and understory. This monitoring should occur in a representative sample of stands that receive each of the following types of treatments: regeneration, commercial thinning, commercial thinning-woodland. The agency should consider whether it would make sense to accomplish some of this monitoring in conjunction with regeneration surveys that typically occur in the third growing season after final harvest.

The Lower Cowpasture project provides an example of this commitment. There, the District committed to the following:

As part of the monitoring plans for the Lower Cowpasture project, the Forest Service will monitor forest (vegetation) structure and composition in the overstory, midstory, and understory within three to five years after harvest. This monitoring will occur in a representative sample of stands that receive each of the following types of treatments: shelterwood with reserves, shelterwood, free thinning, thinning from below, and hardwood restoration. This monitoring will be accomplished in conjunction with regeneration surveys which typically occurs in the third growing season after final harvest.²⁸⁴

We then worked with Warm Springs District staff and other stakeholders to develop a workable monitoring guide for the Lower Cowpasture project that would produce the needed information and was feasible for the District to complete. The guide

²⁸³ Id. at 5-3.

²⁸⁴ See Decision Notice and Finding of No Significant Impact for the Lower Cowpasture Restoration and Management Project, at 8.

included a description of the monitoring activity, as well as designation of the party responsible for implementation.²⁸⁵ The same should be done for this project, and we look forward to discussing monitoring with the District.

With regard to non-native invasive species, the Draft EA does not discuss monitoring at all. As discussed in Section 5.E: Non-Native Invasive Species, this is a critical and large task, and the District must thoroughly address the issue. Before any ground disturbance activities take place, the agency should commit to identifying existing or potential NNIS threats in the management area, developing a control/eradication plan, and implementing that plan. If the agency determines that NNIS control/eradication is likely not possible in a given area, ground disturbing activities should not move forward. The agency also should commit to assessing the need to treat NNIS in harvest units in conjunction with site preparation work which typically occurs in the first or second growing season after final harvest, and in conjunction with regeneration surveys that typically occur in the third growing season after final harvest. And in addition to assessing these needs, the agency must of course commit to treating areas that are determined to need treatment.²⁸⁶

Finally, we recommend that the District commit to an adaptive management approach to the project.²⁸⁷ The concept of adaptive management is foundational for Forest Plan implementation in a dynamic environment.²⁸⁸ Employing adaptive management practices allow quick resolution to changing circumstances and would allow the District to learn and potentially change course during the duration of the project in order to better promote the project purpose.

10. Project area

The District must more clearly define the Eastern Divide Phase II project area. The Draft EA indicates that it is 29,388 acres.²⁸⁹ But what are the boundaries of the project area used for analysis? Is it one large area or multiple small areas surrounding each working area? Does this include national forest land only or private land also? Without this basic information, it is difficult to understand the scale at which this project is being analyzed and assess how the proposed management relates to the objectives and goals of the Forest Plan. The District should

²⁸⁵ See attached email and monitoring form.

²⁸⁶ See also Forest-Wide Non-Native Invasive Plant Control EA (Dec. 2010) at 27-28 (“Sites would be monitored, as required by regional policy, to ensure that control of NNIP populations has been accomplished. It is anticipated that many infested sites would require multiple treatments over several years to gain the desired level of control. Treatment effectiveness monitoring would be a necessary component in determining the frequency and type of successive treatments.”).

²⁸⁷ Adaptive management is defined as “A system of management practices based on clearly identified intended outcomes and monitoring to determine if management actions are meeting those outcomes; and, if not, to facilitate management changes that will best ensure that those outcomes are met or re-evaluated. Adaptive management stems from the recognition that knowledge about natural resource systems is sometimes uncertain.” 36 C.F.R. 220.3.

²⁸⁸ Forest Plan at 5-3.

²⁸⁹ Draft EA 8.

provide a simple map delineating the boundaries of this project area, including national forest and private lands.

11. Inadequate maps

The District should also provide additional maps with more helpful information. For example, labeling and defining the legend management areas and roads would provide the public more information to comment on the District's proposed use of roads in the project area. Additionally, the Appalachian Trail has been re-routed, but the maps still reflect the old route.

12. Alternatives

In light of the above, the District needs to consider a new alternative that proposes management consistent with the Forest Plan, NFMA, and NEPA. Consideration of alternatives is the "heart" of the NEPA process because it defines the issues and provides a clear basis for choices by the decision maker and the public.²⁹⁰ According to NEPA:

Federal agencies *shall, to the fullest extent possible*: [u]se the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment.²⁹¹

To comply with these directives, an agency is required to "look at every reasonable alternative...sufficient to permit a reasoned choice."²⁹² Weighing the benefits and adverse effects of viable alternatives is precisely the function that alternative consideration under NEPA is meant to perform.²⁹³ The failure to consider a "viable but unexamined alternative" renders an EA inadequate.²⁹⁴ This requirement applies to EAs as well as EISs.²⁹⁵ And prematurely rejecting

²⁹⁰ 40 C.F.R. § 1502.14.

²⁹¹ *Id.* at § 1500.2(e) (emphasis added); *see* 42 U.S.C. § 4332(2)(E) ("study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternate uses of available resources."); 40 CFR § 1502.14 ("rigorously explore and objectively evaluate all reasonable alternatives"); *Native Fish Soc. v. Nat'l Marine Fisheries Servs.*, 992 F. Supp. 2d 1095, 1110 (D. Or. 2014), appeal dismissed (May 13, 2015) ("Where a feasible alternative would meet the project's purpose and need, it should be considered.").

²⁹² *Idaho Conservation League v. Mumma*, 956 F.2d 1508, 1520 (9th Cir. 1992) (internal citations omitted); *see also* *Curry v. U.S. Forest Serv.*, 988 F. Supp. 541, 554 (W.D. Pa. 1997) (Forest Service must consider a "broad range of reasonable alternatives"); *Bob Marshall Alliance v. Hodel*, 852 F.2d 1223, 1225 (9th Cir. 1988), cert. denied 489 U.S. 1066 (1989) (NEPA requires federal agencies to "study, develop, and describe appropriate alternatives").

²⁹³ *See* 40 C.F.R. § 1500.2.

²⁹⁴ *Alaska Wilderness Recreation and Tourism Ass'n v. Morrison*, 67 F.3d 723, 729 (9th Cir. 1995) (internal quotations omitted); *accord* *Dubois v. USDA*, 102 F.3d 1273, 1289 (1st Cir. 1996), cert. denied 521 U.S. 1119 (1997); *see also* *Env'tl. Prot. Info. Ctr. v. U.S. Forest Serv.*, 234 F. App'x 440, 443 (9th Cir. 2007) ("A cursory dismissal of a proposed alternative, unsupported by agency analysis, does not help an agency satisfy its NEPA duty to consider a reasonable range of alternatives.").

an alternative, without “informed and meaningful” consideration, denies the public and the decisionmaker a “clear basis for choice among options.”²⁹⁶

Therefore, the District must consider a “broad range of reasonable alternatives.” Since the scoping notice indicated that the District planned to categorically exempt this project, the public has not had the occasion to recommend alternatives until now. Alternative development and consideration begins with an analysis of the project’s purpose and need. For the reasons described throughout these comments, a new alternative should include, but is not be limited to, the following components:

- Conduct site-specific stand examinations to diagnose forest needs in specific areas and develop silvicultural prescriptions that science shows will address those needs;
- Consider gypsy moth science and adjust objectives based on that science;
- Consider the science regarding oak regeneration, including the importance of canopy condition, advanced oak regeneration, site conditions, and other hurdles like deer browse;
- Consider other management activities, such as thinning and prescribed fire, to achieve oak regeneration
- Focus logging in management prescription 8A1 and avoid logging in inappropriate management prescription areas, such as 5C, 6C, 7E2, 9A1, and 11;
- Avoid logging in uninventoried roadless area like the Dismal area;
- Increase the residual basal area to at least the minimum levels analyzed in Forest Plan;
- Thoroughly analyze road/travel impacts, including consideration of the TAP, Clean Water Act requirements, and the impacts of converting trails to roads
- Thoroughly analyze impacts to:
 - o Recreation and scenic resources
 - o Heritage and cultural resources
 - o Threatened, endangered, sensitive, and locally rare species
 - o Climate
 - o Karst
 - o Water quality across the project area
 - o Water quality in light of limited effectiveness of BMPs
 - o Water quality from erosion and sedimentation, including in relation to soil types and slopes
 - o Water quality, including in relation to herbicides
 - o Soil
 - o Old growth
 - o Non-native invasive species
 - o Wilderness characteristics in Dismal Creek
 - o Biological and recreation resources in Dismal Creek

²⁹⁵ Bob Marshall Alliance, 852 F.2d at 1229; see Save Our Cumberland Mountains v. Kempthorne, 453 F.3d 334, 343-44 (6th Cir. 2006) (discussing NEPA requirements to consider alternatives in environmental assessments).

²⁹⁶ 40 C.F.R. § 1502.14.

- o Cumulative impacts;
- Prioritize ecological restoration as means to create ESH, e.g., harvest in low-diversity stands that would benefit from treatment to restore a diversity of structure and tree species, harvest in early- or mid-successional stands that were logged relatively recently and are dominated by maple, poplar, or other non-oak species, logging in pine plantations or other uncharacteristic forest; and
- Commit that all bladed skid trails/roads and temporary roads on slopes of 35% or greater will be less than approximately 300 feet in length.

Implementing these and other changes would still allow the District to meet its purpose and need for this project, and in fact would likely better achieve oak regeneration in the project area. Consideration of these reasonable alternatives is necessary to fulfill agency obligations to “emphasize real environmental issues and alternatives,” and “avoid or minimize adverse effects.”²⁹⁷ Without consideration of reasonable project alternatives, the EA cannot (and does not) meaningfully compare the effects of the possible alternatives available to the District to meet its objectives, denying the public and the District itself a clear basis for a choice among these several options.

²⁹⁷ 40 C.F.R. § 1500.2(b), (e).

13. Conclusion

Thank you again for the opportunity to comment on the Draft EA. We look forward to this project moving forward and continued work with the District and other stakeholders.

Sincerely,



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Attachments

DECLARATION OF ROSE-MARIE MUZIKA, PH. D.

I, Rose-Marie Muzika, Ph. D., declare as follows:

A. Qualifications

1. My name is Rose-Marie Muzika. I am over 18 years of age and competent to make this declaration.
2. My Curriculum Vitae is attached.
3. I earned a Ph. D. in forestry from Michigan State University in 1989. I earned an M.Sc. degree in biology from Clarion University of Pennsylvania and a BA in biology from Seton Hill University.
4. I was a Professor of Forestry for 19 years at the University of Missouri. I taught courses in Forest Ecology, Forest Health & Protection, Field Ecology, and Silviculture.
5. I have been employed by the US Forest Service as an ecologist and an entomologist. From 1989 and 1991 I was a research entomologist with a Pacific Northwest Research Station Unit I LaGrande, OR. I was then an ecologist on the Monongahela National Forest (1991-1992), and research ecologist at the Forest Service research unit in Morgantown, WV.
6. For the past 25 years, I have conducted research in forest health, forest disturbance ecology, and applied ecology.
7. Among my research publications are:
 - Muzika, RM and RS Morin. 2019. Oak Mortality Patterns in the Midwestern US, North America. *International Oaks* 30:341-348
 - Maginel, CJ, BO Knapp, JM Kabrick, and RM Muzika. 2019. Landscape and site level responses of woody structure and ground flora to repeated prescribed fire in the Missouri Ozarks. *Canadian Journal of Forest Research* 49(8):1004-1015
 - Reed, SE, JE English and RM Muzika. 2019. Phytophthora species detected in two Ozark forests with unusual patterns of white oak mortality. *Plant Disease* 103:102-109. DOI: 10.1094/PDIS-02-18-0253-RE
 - Wood, JD, BO Knapp, RM Muzika, MC Stambaugh and L Gu. 2018. The importance of drought-pathogen interactions in driving oak mortality events in the Ozark Border Region. *Environmental Research Letters* <https://doi.org/10.1088/1748-9326/aa94fa>

- Muzika, RM. 2017. Silviculture for management and restoration of forests affected by biological invasions. Biological Invasions doi: 10.1007/s10530-017-1549-3
8. I have published in a number of peer-reviewed journals including: Forest Science; Forest Ecology & Management; Ecological Monographs; Population Dynamics; Biological Invasions; Agricultural and Forest Entomology; Canadian Journal of Forest Research; Plant Disease; Environmental Entomology; among many others.
 9. I have served as an Associate Editor for the follow Journals: Northern Journal of Applied Ecology; Ecological Monographic; Ecology; Forest Ecology & Management; Frontiers in Forests and Global Change. I have reviewed manuscripts for at least 15 different journals.
 10. I am a member of the Society of American Foresters; the Forest Stewards Guild; American Association for Advancement of Science; The Forest History Society; Blacksmiths Association of Missouri, and the American Society of Environmental History.

B. Project Review

11. I have reviewed the Draft Environmental Assessment and Forest Successional Report for the Eastern Divide Phase II Project on the Eastern Divide District of the Jefferson National Forest.
12. I have also reviewed stand data for the project area provided to me by the Southern Environmental Law Center (SELC).
13. I provided a Declaration on this project in June 2019, which I incorporate by reference into the declaration as well.
14. The best scientific information suggests that oak regeneration is difficult, if not impossible, to achieve in the absence of advance oak regeneration. Additionally, significant increases in light can promote oak competitors, to the detriment of oak regeneration, and subsequent management shown to promote oak regeneration should be considered for incorporation into a project with an oak regeneration objective.

Presence of advance oak regeneration in the treated area is critical to ensuring oak regeneration

15. The Forest Service contends that the proposed Shelterwood and Coppice with Reserves regeneration logging will result in oak regeneration in the project area.
16. I understand from reviewing the Draft EA that the Forest Service has not inventoried the amount of advance oak regeneration in the project area, but that there is "little or no

advanced regeneration of oaks in the understories of these stands.” Accordingly, “stump sprouting (coppice) is the most reliable source of regeneration.” (Draft EA at 1.)

17. Regarding oak regeneration from stump sprouting, in mesic stands, Knapp et al. (2017) found stump sprouting, survival and growth of sprouts indicate that coppice regeneration would favor silver maple, American elm, and American sycamore at the expense of oak species.¹ While the sites in the Eastern Divide are mostly upland, it is important to consider that oaks stumps sprouts do not translate consistently into successful regeneration. Furthermore oak sprout ability declines with age and diameter and over half the units in the Project are nearly or over 100 years of age.²
18. The best scientific information shows that regeneration, rather than stump sprouting, is the best indicator of oak regeneration success. Advanced regeneration of oaks that are greater than 7 feet tall is preferred when evaluating oak regeneration potential of mixed hardwood stands.³ Oak stump sprouting alone cannot sustain current oak stocking, for not all stumps produce sprouts.⁴
19. For example, Shelterwood treatments can benefit regeneration in mature hardwood forests by increasing light levels – critical for oak regeneration recruitment and survival. Harvesting to remove ~50% of the initial basal area may be adequate for 50% of full sunlight, and therefore enough to benefit oak regeneration physiologically, while shading out competition from other species.⁵ However, this amount of sunlight can only benefit the stand if advanced regeneration is present. In the absence of advanced regeneration, Shelterwood treatments will likely result in non-oak regeneration.⁶
20. The Forest Service should consider whether intermediate treatments like thinning could better achieve the purpose and need of this project. If the goal is to create canopy

¹ Knapp, B. O., Olson, M. G., & Dey, D. C. (2017). Early stump sprout development after two levels of harvest in a midwestern bottomland hardwood forest. *Forest Science*, 63(4), 377-387.

² Dey, D. C., P.S. Johnson & H.E. Garrett. 1996a. Modeling the regeneration of oak stands in the Missouri Ozark Highlands. *Canadian Journal of Forest Research* 26 :573-583; Johnson, P. S., S. R. Shifley & R. Rogers. 2009. *The ecology and silviculture of oaks*. 2nd edition. CABI Publishing. New York, NY, USA. 560 p.

³ P.H. Brose et al., *Prescribing Regeneration Treatments for Mixed-Oak Forests in the Mid-Atlantic Region at 9 tbl. 2.1* (USDA Forest Service General Technical Report NRS-33 2008)

⁴ Atwood, C. J., Fox, T. R., & Loftis, D. L. (2011). Effects of various silvicultural systems on regeneration in mixed hardwood stands of the southern appalachians. *Journal of Sustainable Forestry*, 30(5), 419-440.

⁵ Schlesinger, R. C., I. L. Sander & K. R. Davidson. 1993. Oak regeneration potential increased by shelterwood treatments. *Northern Journal of Applied Forestry* 10: 149-153.

⁶ Spetich, M. A., D. C. Dey, P. S. Johnson & D. L. Graney. 2002. Competitive capacity of *Quercus rubra* L. planted in Arkansas Boston Mountains. *Forest Science* 48: 504-517; Johnson, P. S., S. R. Shifley & R. Rogers. 2009. *The ecology and silviculture of oaks*. 2nd edition. CABI Publishing. New York, NY, USA. 560 p.

openness for regeneration to develop, a moderate to heavy thinning, which leaves an intact forest while creating opening in the canopy, can serve the same purpose as a Shelterwood treatment, while maintaining wildlife habitat and promoting intactness of the canopy and the forest. As with Shelterwood, the success of this approach is dependent on advanced regeneration.

21. Ultimately, without adequate large oak advance reproduction, oak regeneration failure is all but certain.

Other consideration for oak regeneration silvicultural procedures

22. In addition to adequate oak advance regeneration, the best scientific information shows that other site specific conditions and subsequent management should be considered when proposing silvicultural procedures to regenerate oak.
23. For example, too much light can foster competition from shade intolerant species. If the proposed residual basal area for the Shelterwood with Reserves treatment, 15 to 25 square feet per acre, constitutes more than a 50% reduction of basal area, this would open the canopy substantially more than recommended.⁷ Typically, Shelterwood treatments in Appalachian oak forest should be ~20%, otherwise shade intolerant hardwoods are likely to dominate.⁸
24. In order to adequately assess the intensity of removal, and subsequent impact on the likelihood of oak regeneration, the Forest Service should provide more information on the residual basal area proposed. The residual basal area in the Draft EA for both harvest types does not reveal the amount of removal that will take place, only the absolute basal area remaining. It would be meaningful to put this in the context of percent stocking remaining, or percent BA removed. Each compartment and stand must be treated individually since there are differences in basal area and species composition.
25. Site index should also be factored in when deciding the appropriate silvicultural procedure. For example, heavy cutting on high quality sites may actually lead to a loss of oak from increase competition.⁹
26. And in stand with mixed hardwoods/ white pine, Coppice with Reserves will likely result in very different, multi-species hardwood regeneration since all hardwoods sprout. It is not clear whether the white pine represents the residual overwood, but it

⁷ Schlesinger, R. C., I. L. Sander & K. R. Davidson. 1993. Oak regeneration potential increased by Shelterwood treatments. Northern Journal of Applied Forestry 10: 149-153.

⁸ Stringer, J., 2006. Oak Shelterwood: A Technique to Improve Oak Regeneration, Professional Harwood Notes: Technical Information on Hardwood Silviculture for Foresters, University of Tennessee Extension.

⁹ Dey et al. 2010 An ecologically based approach to oak silviculture: a synthesis of 50 years of oak ecosystem research in North America. Revista Colombia Forestal. 13(2): 201-222.

could be either a regeneration competitor or be eliminated altogether, depending on the amount remaining in the overstory.

27. The Forest Service should also consider subsequent management that would encourage oak regeneration, such as prescribed burning. Oak regeneration can be encouraged following heavy cutting, e.g. coppice, if prescribed burning follows removal.¹⁰ The periodic fires may do little harm to oaks, but can often reduce oak competitors such as tulip poplar or red maple.

C. Relevant Research

28. Relevant research is attached for consideration.

Submitted this 26th day of February, 2019.



Rose-Marie Muzika

¹⁰ Brose, P. H., T. M. Schuler & J. S. Ward. 2006. Responses of oak and other hardwood regeneration to prescribed fire: what we know as of 2005. pp. 123- 135. In: M. B. Dickinson (ed.). General Technical Report NRS-P-1. USDA Forest Service Northern Research Station. Newtown Square, PA, USA.

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EDUCATION

Ph.D. Forestry, Graduate certificate in Ecology and Evolutionary Biology

Michigan State University, East Lansing, MI

M.Sc. Biology, emphasis in Environmental Science

Clarion University of Pennsylvania, Clarion, PA

B.A. Biology Seton Hill University (formerly Seton Hill College), Greensburg, PA

SELECT HONORS, AWARDS, AND PROFESSIONAL DEVELOPMENT

- Fulbright Fellowship, University of Iceland
- Harvard Forest Fellowship, Harvard University
- Huron Mt Wildlife Foundation Manierre Research Award
- Outstanding Undergraduate Advisor Award, University of Missouri
- Outstanding Faculty award, University of Missouri
- Golden Apple Teaching Award, College of Agriculture, University of Missouri
- Tribute to Mizzou Women Award, University of Missouri
- Excellence in Education Award, Division of Student Affairs, University of Missouri
- European Union Center Fellowship, University of Missouri
- Golden Chalk Award for Excellence in Graduate Education, University of Missouri
- Honors Convocation Faculty Mentor, University of Missouri
- LEAD 21 Leadership for the 21st century Leadership Development Program
- University of Missouri System Leadership Development Program

PROFESSIONAL EXPERIENCE

ACADEMIC APPOINTMENTS

ASSOCIATE DIRECTOR OF ACADEMIC PROGRAMS AND RESEARCH

School of Natural Resources, University of Missouri, Columbia, MO

CHAIR, DEPARTMENT OF FORESTRY

University of Missouri, Columbia, MO

PROFESSOR OF FOREST ECOLOGY AND FOREST HEALTH, Department of Forestry, School of Natural Resources,
University of Missouri, Columbia, MO

ADJUNCT PROFESSOR, University of Notre Dame

PROFESSIONAL EXPERIENCE AND APPOINTMENTS

CARNEGIE MUSEUM OF NATURAL HISTORY 2018 - PRESENT

CURATOR of Ecology, Science and Research: Powdermill Nature Reserve

UNIVERSITY OF MISSOURI 1998 - 2017

PROFESSOR (2009), Associate Professor (2004), Assistant Professor (1998)

ASSOCIATE DIRECTOR, School of Natural Resources (2012-2017)

CHAIR, Dept. of Forestry (2008-2011)

DIRECTOR OF GRADUATE STUDIES, Department of Forestry (2003-2008)

DIRECTOR OF CONSERVATION BIOLOGY GRADUATE PROGRAM, (2004-2012)

USDA FOREST SERVICE

RESEARCH ECOLOGIST, NE Research Station, Morgantown, WV (1992-1998)

ECOLOGIST, Monongahela National Forest, Elkins, WV (1991-1992)

RESEARCH ENTOMOLOGIST, PNW Research Station, La Grande, OR (1989-1991)

LEGISLATIVE SERVICE BUREAU, STATE OF MICHIGAN, 1989

SCIENCE POLICY ANALYST

MICHIGAN STATE UNIVERSITY 1985-1989

GRADUATE RESEARCH AND TEACHING ASSISTANT, Department of Forestry and Department of Botany and Plant Pathology

CURRENT RESEARCH, POLICY, AND MANAGEMENT EMPHASES

- Forest health monitoring, detection, management
- Fire Ecology; wildland fire predictions
- Management approaches for invasive species
- Nonnative organisms and ecological dynamics
- Forest disturbance history reconstruction

COURSES TAUGHT AT THE UNIVERSITY OF MISSOURI

Forest Ecology – upper division undergraduate course for natural resources students

Ecology Field studies – field course for 2nd - 3rd year natural resources students

Forest Health and Protection – forest entomology, pathology, management course

Field Botany and Ecological classification – upper division undergraduate course

Honors Discussion Session in Natural Resources – non-major undergraduate Honors topics course

Advanced Forest Ecology – Graduate course

Practice of Silviculture (as co-instructor) – upper division undergraduate course for forestry majors

Covering Nature and Society in the Developing World – co-taught with Journalism faculty in Costa Rica

Other instruction:

The University of Notre Dame: Insect Ecology (undergraduate course).

Taught annually at the Notre Dame Environmental Research Center in northern Wisconsin

West Virginia University: Insect Ecology (graduate course) taught while a research scientist for the USDA Forest Service research, Morgantown, WV

SELECT PUBLICATIONS

IN REVIEW AND IN PRESS

Muzika, RM and RS Morin. *In press* Oak Mortality Patterns in the Midwestern US, North America.

International Oaks

Lee, CA and RM Muzika. *In review*. Facultative parasitism and opportunism in a forest fungus: spatial and temporal pre-positioning as part of forest succession. Fungal Ecology

Maginel, C, BO Knapp, JM Kabrick, and RM Muzika. *In press*. Landscape and site level responses of woody structure and ground flora to repeated prescribed fire in the Missouri Ozarks. Canadian Journal of Forest Research

PUBLISHED

Reed, SE, JE English and RM Muzika. 2019. *Phytophthora* species detected in two Ozark forests with unusual patterns of white oak mortality. Plant Disease 103:102-109. DOI: 10.1094/PDIS-02-18-0253-RE

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- Lee, CA, J Bruhn, RM Muzika. 2017. Distribution of *Heterobasidion irregulare* in Missouri pine-oak forests. North American Fungi, [S.l.], v. 12, p. 1-20, feb. 2017. ISSN 1937-786X. doi:<http://dx.doi.org/10.2509/10.2509/naf2017.012.001>.
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- Yanoviak, SP, E Gora, J Fredlye, PM Bitzer, RM Muzika, WP Carson. 2015. Direct effects of lightning in temperate forests: a review and preliminary survey in a hemlock-hardwood forest of the northern United States. Canadian Journal of Forest Research. 45: 1258-1268
- Muzika, RM, RP Guyette, MC Stambaugh, JM Marschall. 2015. Fire, drought and humans in a heterogeneous Lake Superior landscape. Journal of Sustainable Forestry 34:49-70
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- King, CB and RM Muzika. 2014. Historic fire and canopy disturbance in an oak-pine forest of the Missouri Ozarks (1624-2010). Castanea 79 (2): 78-87
- Lee, CA, SL Voelker, RM Holdo, RM Muzika. 2014. Tree architecture as a predictor of growth and mortality after an episode of red oak decline in the Ozark Highlands of Missouri, USA. Canadian Journal of Forest Research 44:1005-1012.
- Schultz, AN and RM Muzika. 2013. The effect of fire on insect diversity in the Missouri Ozark Highlands. McNair Journal 21:8-12.
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- Muzika, RM, RP Guyette, T Zielonka, and AM Liebhold. 2002. The influence of air pollution on tree growth in the Carpathian Mountains. Pages 185-193 from: Effects of Air Pollution on Forest Health and Biodiversity in Forests of the Carpathian Mountains. NATO Scientific Affairs Division; IOS Press, Amsterdam.
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RECENT REFEREED TECHNICAL PUBLICATIONS OR PROCEEDINGS

- Olson, E.K., R.M Muzika, and S. Farrington, in press. Twenty Years of Ground Flora Community Response to Forest Management in the Missouri Ozarks. Missouri Department of Conservation Technical Bulletin
- Reed, S.E. J. T. English, R M. Muzika, J.M Kabrick, S. Wright. 2016. Characteristics of sites and trees affected by rapid white oak mortality as reported by forestry professionals in Missouri. Pages 240-247 in: Proceedings of the 20th Central Hardwood Forest Conference.
- King, C. B. and R. M. Muzika. 2013. A multi-century analysis of disturbance dynamics in pine-oak forests of the Missouri Ozark Highlands. Pages 50-62 in: Proceedings of the 18th Central Hardwood Forest Conference, GRT NRS – P – 117.
- Guyette, R.P., M.C. Stambaugh, and R. Muzika. 2010. Fire history at the Nickel Preserve, Cherokee County, Oklahoma. Report to Oklahoma Dept. of Wildlife Conservation. 22 pp.
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- Stevenson, A.P., R.M. Muzika and R.P. Guyette. 2008. Fire scars and tree vigor following prescribed fires in Missouri Ozark upland forests. Pages 525-534 In: Jacobs, Douglass F.; Michler, Charles H., eds. Proceedings, 16th Central Hardwood Forest Conference; 2008 Gen. Tech. Rep. NRS-P-24. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station.
- Stambaugh, M.C. and R. M. Muzika. 2007. Successional trends of six mature shortleaf pine forests in Missouri. Proceedings: Shortleaf pine Restoration and Ecology in the Ozarks. Northern Research Station GTR NRS-P-15, Pages 59-67.

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- Voelker, S.L. and R.M. Muzika. 2005. An update on forest health in Missouri: Oak decline, live fast, die young. Notes for Forest Managers, Missouri Department of Conservation.
- Stambaugh, M.C. and R.M. Muzika. 2004. Promoting shortleaf pine: canopy openness and pine regeneration in closed canopy forests. Notes for Forest Managers, Missouri Department of Conservation.
- Liebhold, A.M., K.W. Gottschalk, J.M. Guildin, and R.M. Muzika. 2004. Defoliation potential in the Ouachita / Ozark Highlands. pp 267-272. IN: Ouachita and Ozark Mountains symposium: ecosystem management research. Gen. Tech. Report SRS-74, Asheville, NC.
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- Guyette, R.P., R.M. Muzika, J. Kabrick, and M.C. Stambaugh. 2004. A perspective on *Quercus* life history characteristics and forest disturbance. Pp. 138-142. Upland Oak Ecology Symposium: history, current conditions, and sustainability. USDA Forest Service Gen Tech report SRS-73.
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RECENT INVITED PRESENTATIONS

- “Loss of oak in the Midwestern US: causes and consequences” West Virginia University, Morgantown, WV March 2019
- “What can we learn from tree rings?” Powdermill Nature Center. March 2019
- “Humans, Climate, and Fire: Deciphering the past to understand the present and to predict the future” Moriarity Series Lecture, Carnegie Museum of Natural History. January 2019
- “The Ecology of Fire - A pervasive, powerful & complex environmental influence” University of Pittsburgh, Pittsburgh, PA November 2018
- “Unraveling the enduring mystery of dying oak trees in the Ozarks” Biology Dept Seminar, University of Arkansas, Fayetteville, AR October 2018
- “Oak Mortality Patterns and Causes in the Midwestern US, North America” International Oak Society Conference, Davis, CA October 2018
- “Diagnosing urban forest insect and disease problems” City of Columbia, MO March 2018

“Drought pathogen interactions and implications for tree mortality” USDA APHIS Climate Change Working Group. February 2018

“Understanding climate change and wildfire using dendroecology” University of Pittsburgh Graduate seminar series. October 2017

“Oak decline: a brief history and a complex etiology: North Central Forest pest Workshop. Rolla, MO September 2017.

“Nature, nurture and neglect in Ozark forests.” Ozark Area Bioregional Congress. October 2016 Hammonds’ Mill, MO.

“Silviculture for management and restoration of forests affected by invasive species”. July 2016. IUFRO Task Force conference, Shepards town, WV

“White oak mortality: CSI” June 2016. Presentation to REU students, Harvard Forest, Petersham, MA.

“Climate Change and Forest Disturbance.” April 2016. Earth Day Presentation, Petersham, MA

“Disturbance regimes of the western edge of the Eastern Deciduous Forest” August 2015. Ecological Society of America. In: Dynamics, Conservation Status, and Future of the Eastern Deciduous Forest Biome: A Session in Honor of E. Lucy Braun

“Effect of fire on ground foraging ants” July 2015. Presentation at the University of Notre Dame Environmental Research Center.

“The ecological and silvicultural consequences of disturbance and salvaging on the sustainability and biodiversity of Forest Ecosystems” May 2015 Carnegie Museum of Natural History Powdermill Nature Reserve, Ligonier, PA

“What’s ailing my tree? A Few ideas to consider for diagnosis and remedy” February 2015 City of Columbia Tree Keepers short course. Columbia, MO.

“Ecosystem management for urban areas” March 2015. Missouri community forestry council annual conference. St. Louis, MO.

“Understanding the causes of white oak mortality in Missouri” March 2015. Missouri Forest Resource Advisory Council. Jefferson City, MO.

“Looking at Tree Rings, the inside story of forest health” March 2015. The 53rd Annual Minnesota Shade Tree Course. St. Paul, MN.

“Climate and human effects on fire regimes of the Great Lakes” February 2014. Fire in the Northeast Conference, Yale University, New Haven, CT

“Using dendrochronology to interpret forest health concerns” September 2014. North Central Forest Pest Workshop, Chariton, IA

RECENT RESEARCH GRANTS

Missouri Department of Conservation, 2017-2018. (\$229,832, with one Co-PI) Effects of even-aged and uneven-aged forest management on ground flora and soft mast production in Missouri’s Ozark forests and woodlands.

USDA Forest Service, Forest Health Monitoring. 2016-2017. (\$55,556, with 3 PI’s). Investigating causes of bishop pine (*Pinus muricata* D. Don) mortality on California’s north coast.

Missouri Department of Conservation. 2014-2016. (\$15,000). Investigation of rapid white oak decline.

USDA Forest Service, Forest Health Monitoring. 2013-2015. (\$74,800 , with one Co-PI) White Oak decline evaluation monitoring in the Midwest.

Missouri Department of Conservation. 2012-2014. (\$30,895) Examining the effect of landscape fire on woody vegetation.

Huron Mt. Wildlife Foundation: 2010-2016 (~\$23,000). Boulders as refugia from overbrowsing by moose and deer: evaluating the potential of recolonization.

USDA NIFA International Science and Education. 2011-2014. (\$148,904, with one Co-PI). Internationalization of Forestry Education, Research and Extension: U.S.-Costa Rica Cooperation.

Missouri Department of Conservation. 2009-2016, (\$301,784). Effects of even-aged and uneven-aged forest management on ground flora and soft mast production in Missouri's Ozark forest and woodlands.

National Science Foundation GK12 2011-2014. (\$1,006,355 with three Co-PI). STEM Fellows: ShowMe Nature from elements to ecosystems.

USDA Forest Service. 2010-2013, (\$60,000). Disturbance dynamics and pre 18th century forest structure in pine oak communities of the Ozark Highlands, Missouri.

USDA National Needs Fellowship. 2009-2014, (\$245,000, with one Co-PI). Integrating disciplinary diversity in graduate student education to support forest resource management decisions.

USDA Forest Service, Northeastern Area State and Private Forestry: 2008-2009, (\$16,500). Detection trapping for emerald ash borer on federal lands in Missouri.

USDA Forest Service, Northeastern Area State and Private Forestry: 2008-2009, (\$25,000). Early Detection of Exotic Bark Beetles in Missouri.

National Science Foundation – Division of Environmental Biology: 2006-2010, (\$600,000, with two PI's). Establish Interdisciplinary Undergraduate Mentoring in Environmental Biology.

Oklahoma Department of Fish and Game: 2006-2009, (\$43,489 with one Co-PI). Using Tree Ring Analysis to Determine Fire History In the Oklahoma Ozarks

US Department of Interior – National Park Service: 2006-2008, (\$238,000 with one Co-PI). Fire History of the Great Plains.

USDA Forest Service, Southern Research Station: 2006-2008, (\$21,779). Regional variation in historic red oak borer population

USDA Forest Service, Northeast Area Forest Health Monitoring: 2005-2007, (\$38,621). Effects of prescribed fire on oak pests and invasive plant species.

USDA Agricultural Research Service: 2000-2005, (\$214,307 among 5 Co-PI's). Developing a knowledge base for increasing the number of small farm agroforestry adopters and their financial gain.

USDA Forest Service, Southern Research Station: 2003-2004, (\$12,819). Risk assessment for oak decline in the Ozarks.

USDA Forest Service. Joint Fire Sciences Project: 2001-2005, (\$53,000). Effects of fuel reduction treatments on ground flora, understory and overstory treatments.

University of Missouri European Union Center: 2007 (\$3,500). Developing goals for restoration by quantifying natural communities and land use change in the Czech Republic.

University of Missouri Research Council Grant: 2007 (\$7,474). Identifying competitive interactions and fungal symbionts of native and non-native ambrosia beetles.

Huron Mt. Wildlife Foundation: 2006-2007 (\$8,400). Fire History of the Huron Mountains, Upper Peninsula, MI

RECENT INTERNATIONAL ACTIVITIES

Co-facilitator of a science journalism course in Costa Rica

Lecturer University of Banja Luka, Bosnia

Coordinator of Natural Resources Study abroad program, Czech University of Life Sciences

Invited Guest Lecture, University of Tasmania, Australia

Invited Guest Lecture, Deakin University, Melbourne, Australia

EARTH University, Monteverde Institute, Costa Rica, collaboration on student internships and research

Participation in the International Conference of Dendrochronology, Melbourne, Australia

Brazil (University of Missouri Global Scholars Program) (selected but did not attend)

INVITED PROFESSIONAL ACTIVITIES

Member: International Union of Forest Research Organizations (IUFRO) task force on biological invasions
Board Member: Forest History Society
Science advisor: The Forest Stewards Guild
Member: Society of American Foresters, Educational Policy Review Committee

Service on Editorial Boards

Associate Editor: *Frontiers in Forests and Global Change*
Associate Editor: *Ecological Monographs*
Associate Editor: *Ecology*
Associate Editor: *Northern Journal of Forestry*
Special Issues Associate Editor: *Forest Ecology & Management*

Professional and Trade memberships:

American Association for the Advancement of Science	Phi Kappa Phi
Society of American Foresters	Ecological Society of America
Blacksmiths Association of Missouri	

RECENT SERVICE (REVIEWER)

Grant reviewing: (recent)

National Science Foundation
Environmental Protection Agency
USDA National Institute of Food and Agriculture
USDA NRI Arthropod and Nematode Biology Panel
USDA NRI Invasive Biology of Weedy and Invasive Species in Agroecosystems Panel
NSF Graduate research fellowship panel

Journals (recent):

<i>Canadian Journal of Forest Research</i>	<i>Journal of Ecology</i>
<i>Forest Science</i>	<i>Ecology</i>
<i>Ecological Applications</i>	<i>Northern Journal of Applied Forestry</i>
<i>Bulletin of the Torrey Botanical Society</i>	<i>Environmental Entomology</i>
<i>Journal of Economic Entomology</i>	<i>Biological Invasions</i>
<i>Conservation Biology</i>	<i>Ecological Monographs</i>

UNIVERSITY SERVICE:

Campus Writing Board Executive Committee
Environmental Studies Executive Committee
Search committees, College of Law, Depts of Geography, Biological Sciences, Fisheries and Wildlife, School of Natural Resources
Promotion and Tenure Probationary Extension Committee
University Lectures Committee
MU Sustainability Committee
International Studies Committee
Policy Committee
University of Missouri Campus wide Fellowship advisory Board
University of Missouri Committee on Undergraduate Education

UNDERGRADUATE RESEARCH MENTORING:

A total of 18 undergraduate students have worked in the forest ecology lab through employment in research projects with graduate students, special projects through UMEB Grants or GK12 programs and 4 students were McNair Scholars.

GRADUATE STUDENTS MENTORED (AS MAJOR ADVISOR) AT THE UNIVERSITY OF MISSOURI

Michael C. Stambaugh	M.S.- Forestry	2001
Taisia M. Gordon	M.S.- Forestry	2002
Alicia Sasseen	M.S.- Forestry	2002
Heather O'Connor	M.S.- Forestry	2002
Steven L. Voelker	M.S.- Forestry	2004
Susan J. Farrington	M.S.- Forestry	2005
Mark D. Yates	Ph.D. -Forestry	2006
Aaron P. Stevenson	M.S.- Forestry	2007
Irene M. Unger	Ph.D.- Forestry	2008
Nancy Mungai	PhD- Soil Science	2008
Sharon Reed	Ph.D.- Forestry	2010
Ronald Colatski	M.S.- Forestry	2011
Chad King	Ph.D.- Forestry	2013
Elizabeth Wright	M.S. – Forestry	2013
Christine Steinwand	M.S. – Forestry	2014
Christopher Lee	Ph.D.- Forestry	2016
Calvin Maginel	M.S. – Natural Resources	2015
Muhammed Nugraha	M.S. – Natural Resources	2018

Graduate students mentored as a member of graduate committee:

Kathryn Womack	PhD	F&W	Carla Kruse	MSc	Parks &Rec
Freya Womack	PhD	Biological Sciences	Nicholas Bezzerides	PhD	F&W
Denise Vaughn	MA	Journalism	Dean Grey	PhD	Forestry
John Nichols	MSc	Forestry	Cynthia Becker	MSc	Forestry
Robert Rives	MSc	Forestry	Dulce Figueroa-	PhD	Biol. Sci
Sara Bellchamber	MSc	Forestry	Olga Pinzon	PhD	Entomology
Jonathan White	MSc	Entomology	Joshua Swanson	MA	Geography
Kyle Steele	MSc	Forestry	Mundy Hackett	PhD	F&W
Mark Mackey	MA	Biological Sciences	Tom Demeo	PhD	Forestry
Jennifer Hamilton	MA	Geography	Teri Tamboia	PhD	Biol. Sci
Matthew McCloud	PhD	F&W	Tom Faust	PhD	Forestry
Shannon Pittman	PhD	Biological Sciences	Frank Nelson	MSc	F&W
Jennifer Grabner	MSc	Forestry	Mevin Hooten	MSc	Forestry
Gorden Shaw	MSc	Forestry	Joseph Riley	PhD	Forestry
Francis Lloyd	PhD	Entomology	James Mudd	PhD	Forestry

Outside Reader: Michelle Bassett, Ph. Deakin University, Melbourne, Australia